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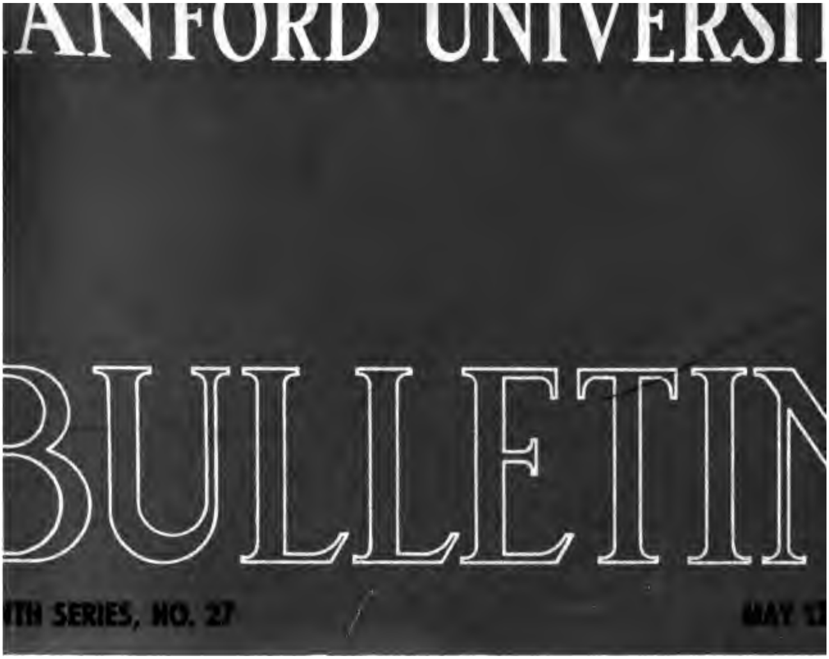

ANFORD UNIVERSI

BULLETIN

TH SERIES, NO. 27

MAY 1

ANNOUNCEMENT
OF COURSES
1954-1955

STANFORD UNIVERSITY BULLETINS

[Entered, January 22, 1920, at Palo Alto, California, as second-class matter, under Act of Congress of August 24, 1912. Acceptance for mailing at special rate of postage provided for in Section 1103, Act of October 3, 1917. Authorized on August 23, 1918. Issued once a month in March, June, and November; twice a month in January, February, April, August, and October; and three times in May.]

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Information	January
Summer Quarter	February
Hopkins Marine Station	March
Graduate School of Business	April
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Announcement of Courses	May
School of Nursing	June
School of Medicine	August
Let's Talk About Stanford	October

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STANFORD UNIVERSITY, STANFORD, CALIFORNIA

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STANFORD UNIVERSITY

ANNOUNCEMENT OF COURSES

1954-1955

STANFORD, CALIFORNIA
PUBLISHED BY THE UNIVERSITY

1954

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S	M	T	W	T	F	S
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
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AUGUST

1	2	3	4	5	6	7
8	9	10	11	12	13	14
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SEPTEMBER

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5	6	7	8	9	10	11
12	13	14	15	16	17	18
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OCTOBER

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3	4	5	6	7	8	9
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NOVEMBER

..	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
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DECEMBER

..	..	..	1	2	3	4
5	6	7	8	9	10	11
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1955

JANUARY

S	M	T	W	T	F	S
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2	3	4	5	6	7	8
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FEBRUARY

..	..	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
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MARCH

..	..	1	2	3	4	5
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..	1	2	3	4	5	6
7	8	9	10	11	12	13
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25	26	27	28	29	30	31

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UNIVERSITY CALENDAR

1954

AUTUMN QUARTER

Sept.	24	Friday, 8:00 A.M.	English Matriculation Test
Sept.	24	Friday, 2:00 P.M.	Language Placement Test
Sept.	27–28	Monday–Tuesday	Registration for Autumn Quarter
Sept.	29	Wednesday	Instruction begins
Oct.	1	Friday	Conferring of Degrees
Oct.	3	Sunday	Matriculation Sunday
Nov.	25–28	Thursday–Sunday	Thanksgiving Recess
Dec.	13–17	Monday–Friday	End-Quarter Examinations

1955

WINTER QUARTER

Jan.	2	Sunday, 1:30 P.M.	English Matriculation Test
Jan.	3	Monday	Registration for Winter Quarter
Jan.	4	Tuesday	Instruction begins
Jan.	7	Friday	Conferring of Degrees
Feb.	22	Tuesday	Washington's Birthday (Holiday)
Mar.	9	Wednesday	Founders' Day
Mar.	14–18	Monday–Friday	End-Quarter Examinations

SPRING QUARTER

Mar.	26	Saturday, 1:30 P.M.	English Matriculation Test
Mar.	28	Monday	Registration for Spring Quarter
Mar.	29	Tuesday	Instruction begins
April	1	Friday	Conferring of Degrees
June	10–15	Friday–Wednesday	End-Quarter Examinations
June	18	Saturday	Senior Class Day
June	19	Sunday	Baccalaureate Sunday
June	19	Sunday	Commencement

SUMMER QUARTER

June	25	Saturday, 1:30 P.M.	English Matriculation Test
June	27	Monday	Registration for Summer Quarter
June	28	Tuesday	Instruction begins
July	4	Monday	Independence Day (Holiday)
Aug.	18–23	Friday–Tuesday	Eight-Week Term Examinations
Aug.	23	Tuesday	Eight-Week Term closes
Sept.	6	Tuesday	Quarter closes

CONTENTS

PAGE

AIR SCIENCE AND TACTICS.......... 9

GRADUATE SCHOOL OF BUSINESS 13

SCHOOL OF EDUCATION 25
  Hygiene 45
    Health Education 45
    Physical Therapy 47

SCHOOL OF ENGINEERING.......... 51
  Aeronautical Engineering 60
  Civil Engineering 64
  Electrical Engineering 70
  Engineering Mechanics 79
  Industrial Engineering Program 84
  Mechanical Engineering 86

FOOD RESEARCH INSTITUTE 94

GRADUATE DIVISION SPECIAL PROGRAMS 98

HOOVER INSTITUTE AND LIBRARY ON WAR, REVOLUTION, AND PEACE.. 100

HUMANITIES AND SCIENCES.......... 103
  Art and Architecture 104
  Asiatic and Slavic Studies 110
  Biological Sciences 115
    Marine Biology and Oceanography.......... 127
    Natural History 129
  Chemistry and Chemical Engineering.......... 131
  Classics 143
  Economics 149
  English 159
  Geography 172
  Germanic and Romanic Languages.......... 176
  History 195
  Humanities (Special Programs).......... 208
    Honors Programs, Hispanic American Studies, Pacific-Asiatic and Russian Studies, and Religion
  Institute for Journalistic Studies.......... 216
  Mathematics 221
  Music 228
  Philosophy 235
  Physical Sciences (General Program).......... 241
  Physics 242
  Political Science 252
  Psychology 261

PAGE

- Social Sciences (Special Programs) 268
- Sociology and Anthropology 274
- Speech and Drama 284
- Statistics 301

SCHOOL OF LAW 306

LIBRARIES 317

SCHOOL OF MEDICINE 320

- Anatomy 322
- Bacteriology and Experimental Pathology 324
- Chemistry 326
- Medicine 326
- Obstetrics and Gynecology 330
- Pathology 331
- Pediatrics 332
- Pharmacology and Therapeutics 334
- Physiology 335
- Public Health and Preventive Medicine 338
- Radiology 339
- Surgery 340
- School of Nursing 345
- Predental Curriculum 348

MEMORIAL CHURCH 349

MILITARY SCIENCE AND TACTICS 350

SCHOOL OF MINERAL SCIENCES 355

NAVAL SCIENCE 377

PHYSICAL EDUCATION 379

INDEX 385

STANFORD UNIVERSITY

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[The figures in parentheses indicate year of beginning of service.]

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Mineral Technology: O. Cutler Shepard
Naval Science:
Physical Education and Athletics: Alfred R. Masters
Physical Education for Women: Maud L. Knapp

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† Acting for academic year, 1954–55.

COURSES OF INSTRUCTION

1954–55

[The asterisk (*) indicates that the course is repeated for the quarter named; otherwise courses announced for two quarters or more may be interpreted as continuing from one quarter to the next. Unless otherwise specified, courses numbered from 1 to 99 inclusive are primarily for Lower Division undergraduates; from 100 to 199 inclusive, for Upper Division undergraduates; from 200 to 499 inclusive, for graduate students.

Faculty members on leave are indicated in the faculty listings by a dagger (†) preceding the name.

The University reserves the right to make any necessary changes in the regulations, fees, and courses outlined herein.]

SUMMER QUARTER

The summer quarter of 1955 will be eight weeks in length, except in certain schools which will offer ten-week courses.

This announcement includes, for the summer quarter of 1955, only those courses which can be tentatively scheduled at this time by each department. For the complete list of courses and faculty, application should be made for the special *Summer Quarter Bulletin* to be issued in February 1955.

AIR SCIENCE AND TACTICS

RALPH W. KELLER, Lieut. Colonel, U.S. Air Force, Professor
FRED C. CHASE, Major, U.S. Air Force, Assistant Professor
EDMOND J. MANTANI, Major, U.S. Air Force, Assistant Professor
ROY M. PITT, Major, U.S. Air Force, Assistant Professor
GEORGE B. SCOFIELD, Major, U.S. Air Force, Assistant Professor
WILLIAM H. POWELL, Major, U.S. Air Force, Assistant Professor
FRANK E. WILLIAMS, JR., Captain, U.S. Air Force, Assistant Professor

General.—The National Security Act of 1947 established the United States Air Force as a separate military establishment under the Department of Defense, and in July 1949 a separate four-year Air Force Reserve Officers' Training Corps program was inaugurated at Stanford under the newly organized Department of Air Science and Tactics.

A key requirement of this program is the commissioning of a high percentage of Air Force officers interested in and qualified for flying training in the USAF.

Objectives.—The AFROTC program is designed to fulfill required academic standards in order that cadets may receive credit in proportion to their academic load; to provide that fundamental training, both personal and professional, which will best fit the cadet to become a well-rounded junior Air Force officer possessing a high growth potential; and to develop and stimulate a growing desire on his part to enter the Air Force flight training program. Specific objectives are as follows:

1. To select students for the advanced course, and where practicable, for the basic course, who are potentially best qualified to serve as officers of the USAF.

2. To arouse in the cadets a desire to serve as officers of the USAF.
3. To develop in the cadets those attributes of character, personality, and leadership which are essential to an officer of the USAF.
4. To provide the cadets with the knowledge and understanding which will enable them to serve as junior officers of the USAF. This objective recognizes the need today for officers with a wide vision of social and scientific problems and an understanding of national, international, and global concepts.

The practical training in organization, leadership, and discipline is of value, also, in industrial or professional careers. The courses have a content of general educational value, complementing and supplementing related courses offered by other departments of the University.

Deferment.—Under the provisions of Public Law 51, 82d Congress (Universal Military Training and Service Act) and pertinent Air Force regulations, selected students of the basic AFROTC courses may be granted deferment from selective service induction. Those selected will sign an agreement to accept a commission as an officer of the United States Air Force, if tendered; and to serve as such on active duty for a period of not less than two years, if called; and to remain a member of the service in a reserve status for a total period of 8 years. Selection is limited by quotas allotted to Stanford by the Air Force.

Those students who satisfactorily complete the basic course are then considered by a board of officers for selection to enroll in the advanced course. Enrollment in the advanced course is again limited by a quota. Deferment is automatically extended for students who are selected.

Selection for the advanced course is highly competitive and only those cadets who are above average academically and in leadership qualities will be eligible for continued enrollment. Constant cumulative evaluation of each cadet is maintained during the advanced course. Deferment must be cancelled immediately upon withdrawal or discharge from the program for any cause, during either the basic or advanced course.

Conditions for Enrollment in the Basic Course.—Eligibility for membership in the AFROTC is limited to regularly enrolled students of Stanford University, who are not less than 14 years of age or more than 23 years of age, who are citizens of the United States, whose physical condition is such that they are fit for military service or will be upon attaining military age, who meet established moral and character requirements, who successfully complete such general survey or screening tests as may be prescribed, and who have at least twelve quarters (exclusive of summer work) remaining at the time of enrollment. Due to Selective Service laws *Freshmen who do not enter the program their first quarter are not admitted later.*

Basic Course.—Three hours per week (two hours theoretical and one hour practical) during the first six quarters of the Air Science program. Basic course students are furnished a complete Air Force uniform, worn during the weekly period devoted to drill and command. Two hours of academic credit are allowed for each quarter.

The basic course is designed specifically to arouse an interest in the Air Force, giving desirable citizenship training in an air age appropriate to a student's edification whether or not he continues his Air Force reserve training. The first-year course is one of orientation to the AFROTC and to the field of aviation, followed by geographical, political, and historical concepts considered essential to understanding the role of the Air Force in world affairs. The second-year offering is designed to acquaint the cadet with Air Force activities and officer career fields.

Conditions for Enrollment in the Advanced Course.—Eligibility for enrollment in the advanced course is based on satisfactory completion of the basic course, or on credit granted, at the discretion of the Professor of Air Science and Tactics and the President of the University, for previous training either in active military service or in an AFROTC unit at another college or in one of the service academies. In addition, the student must:

1. Be selected, within assigned quotas, to pursue the Advanced Course by the Professor of Air Science and Tactics and the President of the University.
2. Be a citizen of the United States.
3. Not have reached 25 years of age.
4. Agree in writing to complete the AFROTC University program and the prescribed summer camp, contingent upon his remaining in college.
5. Be accepted by the University as a regularly enrolled student.
6. Be physically qualified under standards prescribed.

Advanced Course.—The advanced course years require five hours per week of instruction (including one hour of drill) and students are allowed four hours of academic credit for each quarter.

In the advanced course phase the aim is to develop personal qualifications of the cadet officer by widening his background of experience, and strengthening his character and those qualities of leadership essential to a young officer. Such a subject as Military Aspects of World Political Geography, for illustration, stresses Air Force application in which the geographic bases of power and its strategic aspects are considered. Subjects taught to develop personal qualifications include the AF Commander and Staff, Problem Solving Techniques, Career Guidance, Leadership Seminar, and Briefing for Commissioned Service. The remainder of the subjects fortify leadership training, supplementing previous information, and provide orientation to the Air Force.

Cadets normally attend camp for four weeks in the summer that follows completion of their first advanced year. It is desired through the summer camp to make practical application of the information and techniques learned in the classes and leadership laboratories. Also, it is felt advantageous to acquaint the student with military life through some flying experience. Familiarization flying for eighteen hours, whether the cadet intends to attend flying school or not, introduces the officer candidate to the operational phases of the air fighting force.

Emoluments, Advanced Course.—Advanced students are issued a complete uniform. They are paid (as commutation of subsistence) at the rate of approximately $27 per month, and during summer camp receive the pay of airmen of the first pay grade, $78 per month. A travel allowance of five cents per mile for travel to and from camp is authorized.

Distinguished Graduates.—Under provisions of federal law, advanced students who are outstanding, both academically and in leadership, in military courses and in campus activities, are designated Distinguished Military Graduates upon the concurrent recommendation of the Professor of Air Science and Tactics and the President of the University. Such graduates are given special consideration should they desire, after eighteen months service, to apply for regular commissions.

Flight Training.—Any AFROTC graduate may apply for and be assigned to pilot or navigator training in officer grade, provided he is able to meet mental, physical, and age requirements. Preference in selection for the advanced course is given to those cadets who are qualified for and clearly interested in such assignments.

Days and Hours of Instruction.—Announcement of days and hours for the following courses will be found in the *Time Schedule* each quarter:

FIRST-YEAR COURSES

10. Introduction to AFROTC and to Aviation.
2 units, autumn quarter.

11. Fundamentals of Global Geography and International Security Organizations.—A continuation of A.S. 10.
2 units, winter quarter.

12. Instruments of National Military Security.—A continuation of A.S. 11.
2 units, spring quarter.

SECOND-YEAR COURSES

34. Elements of Aerial Warfare, I (Targets and Weapons).
2 units, autumn quarter.

35. Elements of Aerial Warfare, II (Delivery Aircraft, The Air Medium).—A continuation of A.S. 34.
2 units, winter quarter.

36. Elements of Aerial Warfare, III (Air Bases, Air Force Organization, Air Force Careers).—A continuation of A.S. 35.
2 units, spring quarter.

THIRD-YEAR COURSES

122. Functions of Command and Staff.
4 units, autumn quarter.

123. Applied Air Science, I (Military Law, Aerodynamics and Propulsion).—A continuation of A.S. 122.
4 units, winter quarter.

124. Applied Air Science, II (Navigation, Weather, Air Base Functions).—A continuation of A.S. 123.
4 units, spring quarter.

FOURTH-YEAR COURSES

142. Principles of Leadership and Management (Seminar).
4 units, autumn quarter.

143. Military Aspects of World Political Geography.
4 units, winter quarter.

144. Military Aviation and the Art of War.
4 units, spring quarter.

GRADUATE SCHOOL OF BUSINESS

GEORGE WILLIAM DOWRIE, EDWARD KELLOGG STRONG, JR., Professors Emeriti

J. HUGH JACKSON (*Dean*), HERBERT E. DOUGALL, DAVID ERNEST FAVILLE, THOMAS W. HARRELL, PAUL EUGENE HOLDEN, THEODORE JOHN KREPS, ARTHUR KROEGER, OSWALD NIELSEN, CARLTON ANKER PEDERSON, HARRY JOHN RATHBUN, FRANK KUHNS SHALLENBERGER, WILLIAM A. SPURR, Professors

JOHN PHILIP TROXELL, Professor of Industrial Relations, and Director, Division of Industrial Relations

DALE YODER, Visiting Professor of Industrial Relations (Winter Quarter)

PAUL S. ARMSTRONG, WILLIAM HERBERT CARR, S. WALDO COLEMAN, HARRY D. COLLIER, PAUL LEWIS DAVIES, RALPH K. DAVIES, DON E. GILMAN, ALEXANDER R. HERON, LAURENCE WILLIAM LANE, JOY LICHTENSTEIN, EDWARD CROSSLEY LIPMAN, FLOYD LESTER MCELROY, ERNEST B. MACNAUGHTON, THEODORE S. PETERSEN, ARTHUR B. POOLE, ALMON E. ROTH, CLIFFORD ERNEST SCHINK, JAMES E. SHELTON, PAUL A. SINSHEIMER, DEAN WITTER, Consulting Professors

RICHARD A. FRANK, GAYTON ELWOOD GERMANE, Associate Professors

LEVERN W. CUTLER, Director of the Business Library

RALPH A. YEO, Lecturer in Income Taxation (autumn and spring quarters)

H. LELAND WEBER, Lecturer in Purchasing (Winter Quarter)

RAE OLSEN WIRTZ, Instructor in Secretarial Training

CAROL REMELE, Executive Secretary

[Members of the faculties of other divisions of the University giving courses in the Graduate School of Business are listed with their respective faculties.]

OBJECTIVES OF GRADUATE BUSINESS TRAINING

The purpose of the Graduate School of Business is to prepare men and women for effective service in business, and to develop in them habits of thought that make for continuing growth. In accomplishing its goal of training students for junior executive positions in business or for teaching positions in institutions of higher learning, it emphasizes especially the following objectives:

1. The development of an appreciation and understanding of the human and material factors that make up the subject matter of business.
2. Intensive training in handling the records, tools, and technical aids by means of which business is administered and controlled.
3. The mastery of the basic principles of management, with practice in adapting and applying them to particular business situations.
4. The inculcation of the habit of basing all action on a careful and scientific analysis of essential data.
5. The stimulation of an aptitude for wise and timely action, which is the essence of executive leadership.

THE UNITY OF MANAGEMENT

Business schools came into the system of higher education at a time when specialization in professional study was at its height. It was natural, therefore, for the scientific study of business to be directed largely toward the functional divisions of business—accounting, finance, production, marketing, personnel administration, and the like—rather than toward management as a whole. The manner in which management becomes a unifying and co-ordinating force, however, deserves special emphasis. It is the central management of a business that determines the common ends toward which effort shall be directed, and the present-day student of business should be brought to foster the habit of regarding business problems from the viewpoint of this general, as well as from the departmental or divisional, management.

It is this essential unity of management, accordingly, that the Graduate School of Business emphasizes throughout its entire program of study. In presenting the problems that arise in the various functional divisions of business, effort is also made to develop those habits of mind whereby students instinctively think of a business as a unit and work out the solution of their problems with the requirements of the whole business in mind.

LIBRARY FACILITIES

The University Libraries contain more than 2,000,000 volumes, pamphlets, and manuscripts, including a large collection of the important books on business. The Document Division, containing the Library's collection of municipal, state, and federal documents, and the special Hopkins Transportation Library, a collection of approximately 26,000 volumes and pamphlets relating to transportation, are of especial interest to students of business.

The special library of the Graduate School of Business is primarily a working laboratory available to business students in the daily preparation of their assigned work. It contains in excess of 130,000 pamphlets and reports, in addition to 20,000 of the more important books relating to business. The library also receives regularly about 700 trade, financial, labor, and general business periodicals. In addition, it subscribes to the leading financial, labor, marketing, and business research services.

THE DIVISION OF INDUSTRIAL RELATIONS

The Division of Industrial Relations, established in 1936, is a component part of the Graduate School of Business, but all students of the University, have the benefit of its up-to-date information and material concerning industrial relations.

The division is devoted to gathering and distributing impartial information as to actual current developments in this important field. Its activities include instruction in industrial relations; the development of a comprehensive library of industrial relations material; the preparation of current reports on subjects of immediate and vital interest in the field of industrial relations; and the holding of conferences for labor leaders and industrial relations executives.

THE SUMMER QUARTER

The Graduate School of Business operates on a four-quarter basis and, accordingly, a program of courses is offered during the summer quarter. By this means the student is enabled to complete his work for the Master of Business Administration (M.B.A.) degree in six continuous quarters, or eighteen calendar months. In the Graduate School of Business the summer quarter is divided into two terms and either students or faculty may be on duty one or both terms.

Announcement of the courses which will be offered in the summer of 1955 will be made in February of that year. Courses in the summer quarter are provided for second-year students only, as new students are not admitted to the School except at the beginning of the autumn quarter.

EMPLOYMENT

It must be recognized that the University alone cannot supply that capstone of discipline which is afforded by actually doing the job. A person who advances through successive positions in business secures a kind of discipline which, though largely intangible, is nevertheless essential.

By making business the subject of professional study, and replacing apprenticeship with systematic schooling, entry into business is postponed and the period of orientation, even for superior graduates of professional schools, thus becomes one of greater difficulty and increasing hazard.

The Graduate School of Business makes no guaranties with reference to employment. However, there has been a constant demand for the graduates of the School, and those students who have done satisfactory work in the School have had little difficulty in obtaining permanent positions upon graduation. Moreover, the School is constantly assisting its graduates to find positions for which they are qualified.

THE SCHOOL'S CONTACT WITH BUSINESS

In the modern school of business it is essential to draw much of the teaching material from business itself. If these educational materials are to be accessible, it is important that members of the teaching staff work in close co-operation with responsible businessmen. In this respect, the auspices under which the Graduate School of Business at Stanford was founded, and continues to operate, are especially fortunate. Invaluable data for teaching purposes have been placed at the disposal of the School by various concerns engaged in accounting, banking, manufacturing, selling, co-operative marketing, foreign trade, industrial relations, and management consulting service. Opportunities for faculty and student participation in projects involving business research and analysis have also been opened up through contact with business and industrial groups which frequently have indicated a desire to submit some of their problems to the School for study.

In order to cement even more closely the School's association with business, the Graduate School of Business, with the approval of the President of the University and the Board of Trustees, created in February 1935, the title of Consulting Professor. Under this plan the Board of Trustees, upon the recommendation of the Dean of the Graduate School of Business to the President of the University, will appoint selected businessmen as Consulting Professor, Associate Consulting Professor, Assistant Consulting Professor, or Consulting Instructor. Such appointments, the first of which became effective with the academic year 1935–36, make possible very unusual opportunities for young people training for business to benefit from the wisdom and experience of leaders on the actual "firing line" of finance and industry.

Moreover, as an integral part of the program of the School, arrangements are made for students to visit important near-by industrial, commercial, and financial organizations. These visits are carefully co-ordinated with the work on the campus, and students are required to discuss in written reports typical business problems of each business visited. Business concerns have shown unusual willingness to co-operate with the School in this respect, and in this way have contributed much to the program of the School.

PREPARATION AND ADMISSION

Persons who hold a Bachelor's degree from an approved college or university, or students from foreign countries who present evidence of equivalent training, may make application for admission to the Graduate School of Business and become candidates for the M.B.A. degree. At present, new students are admitted only at the beginning of the autumn quarter and applications must be filed before June 1.

College students who contemplate entering the Graduate School of Business are advised to direct undergraduate study toward developing powers of accurate observation and correct habits of thought, both in respect to relatively exact data as found in the laboratory sciences and to the more contingent data of the several social sciences. Although no specific subjects are required for admission to the School, *prospective students will find it very helpful to have had* *basic courses in economics, psychology, mathematics, and business law, as well as thorough training in written and oral English.* The program of study is organized so that students who enter without such preparation may secure certain necessary training in lieu of elective courses in the Graduate School of Business. In considering the relative merit of applicants, therefore, more attention is given to the quality of work done and to the evidence of promise shown during the student's undergraduate course than to the particular subjects studied.

The credentials required are (1) application for admission to the University with graduate standing, including the application fee of five dollars; (2) special application for admission to the Graduate School of Business; (3) official transcript of all college work completed, including certificate of degrees received; (4) statements of personal qualifications on blanks furnished by the University.

Inquiries concerning the Graduate School of Business and requests for application forms should be addressed to the Executive Secretary of the School.

FEES AND EXPENSES

The Application Fee for all candidates for admission to the University, and for all registered students applying for admission to the Graduate Division, is $5, payable at the time of application.

The Tuition and Required Fees for students in the Graduate School of Business are $265 per quarter.

The cost of an academic year's work in the Graduate School of Business (including tuition, fees, books, board and room, and necessary incidental expenses, but not cost of clothing) is estimated to be between $1,600 and $1,900, the variation being due to the tastes and habits of the individual. One of the incidental items of expense, the cost of having reports typed, may be saved by students who do their own typing.

Students are strongly advised not to depend upon outside employment for any considerable part of their total expense while registered in the School. Experience has shown that full-time attention to the work of the School is very desirable for the best results, and that it is usually better to postpone entrance than to depend to any material extent upon outside earnings while registered as a student.

DEGREES

Master of Business Administration

The degree of Master of Business Administration (M.B.A.) is conferred, upon the recommendation of the Committee on Graduate Study, when the student has fulfilled the requirements laid down by the faculty of the Graduate School of Business.

The degree is conferred upon the completion, with high standing, of 95 units of work, normally requiring a residence of six quarters in the School. A longer period of residence will be necessary for candidates who are inadequately prepared, or who devote less than the normal proportion of time to their studies. In the case of candidates who enter the Graduate School of Business with advanced standing, the period of residence, which cannot be less than three quarters, and the number of additional units required for the degree will be determined by the faculty.

Doctor of Philosophy

For those students who are interested in preparing for teaching in institutions of higher learning, or for technical research in business, the School offers a program of study leading to the degree of Doctor of Philosophy in Business. While the following is a summary of the requirements for that degree, prospective and current students are advised to request the School for a more complete statement regarding the Ph.D. program.

General University Regulations.—Students intending to work toward the degree of Doctor of Philosophy (Ph.D.) under the jurisdiction of the Graduate School of Business are held for the general requirements of the University concerning that degree, as set forth in the *Information Bulletin.* A careful study of these requirements is recommended.

Admission.—For credentials to be filed, see "Preparation and Admission," page 15. A tentative statement of the student's proposed program of study and research should accompany these credentials.

Selection of Degree Candidates.—The proposed program of study is reviewed before or during the student's first quarter of study by the Ph.D. Committee and major professors, and is then filed with the Executive Secretary. A student will not be encouraged to continue toward the Ph.D. unless he shows superior aptitude and achievement. At the close of each quarter the student's record will be reviewed and he will be advised to discontinue his program if his progress is unsatisfactory.

Major and Minor Requirements.—The student must demonstrate a high degree of competence in at least four fields of business, ordinarily selected from the following: Accounting, Business and Government, Business Statistics, Finance and Banking, Foreign Trade, Industrial Management, Marketing, and Personnel and Industrial Relations. In addition to the major, the student is required to have either (1) a minor under the jurisdiction of a department outside of the Graduate School of Business, or (2) a co-ordinated program of nonbusiness courses, approved by the faculty of the School, totaling at least 30 units of work of graduate quality. The student must pass with high standing a general written examination in each of the four fields that constitute his major in business, and in the minor field, if any.

General Course Requirements.—In addition to the four major business fields, candidates will be expected to be familiar with the elements of the other basic subjects of business.

Oral Examination.—Subsequent to the general written examinations, the student must pass the final oral examination provided for by University regulations. To determine the scope of the material to be covered by the oral examination, students should consult the professors in the various fields.

Dissertation.—For the regulations concerning the dissertation, see the *Information Bulletin.*

Requirements for a Minor in Business.—Candidates for the Ph.D. degree with a major in a field other than business, and who elect a minor in business, must take a general written examination in each of two fields within the jurisdiction of the Graduate School of Business and will also be examined on these two fields in the oral examination. Preparation for these examinations will ordinarily require, in addition to the offerings of the Graduate School of Business in the two selected fields, such fundamental background courses as Business Organization, Accounting, Statistics, Business Psychology, and Business Economics. Candidates who intend to offer a minor in business must have the fields and the courses or other means of preparation for the examinations approved by the School Committee on the Doctor of Philosophy Degree.

COURSE OF STUDY

The entire program of work offered in the Graduate School of Business is designed and organized to include the following types of discipline:

A. An analysis of certain economic, geographical, legal, psychological, and technical aspects of management.

B. The development of an understanding of general management problems from the standpoint of a co-ordinated business unit. During the first year this work centers around the principles of organization and management which govern the structure and relationships within a business enterprise. The second year's work deals with broader questions of business policy.

C. The acquisition of a grasp of the chief functional or divisional fields into which business is divided for purposes of effective administration.

D. Specialization in a particular field. This is effected by means of elective courses and through supervised individual research during the second year. When planning their second-year programs students who wish to specialize in Accounting, Banking and Finance, Business and Government, Foreign Trade, Marketing, Personnel and Industrial Relations, Production, or Statistics should consult with the Dean, or with the major professor in their selected field.

PROGRAM FOR 1954–55†

MASTER OF BUSINESS ADMINISTRATION

FIRST YEAR

*Autumn Quarter**

200. Sources of Business Information
202. Business Economics
204. Managerial Economics
212. Management Accounting
240. Geographical Aspects of Business
260. Business Organization
265. General Transportation

Winter Quarter

213. Cost Accounting
220. Business Finance
231. Business Statistics
270. Psychological Aspects of Business

Spring Quarter

221. Business Finance
232. Business Forecasting
248. Marketing
250. Industrial Management

SECOND YEAR

Autumn Quarter

314. Auditing
321. Investments and Investment Institutions
322. Commercial Banking
331. Business Research Methods
332. Industry Analysis
340. Marketing
342. Retail Store Management
350. Industrial Management
356. Production Processes
370. Personnel Administration
373. Human Relations
376. Government Policy on Labor Relations
381. Highway and Railroad Transportation
390. Individual Research
391. Directed Reading
392. Ph.D. Thesis

Winter Quarter

303. The Law in Business Transactions I
306. Introduction to Business and Government
318. Accounting Organization and Comptrollership
323. Investment Research and Analysis
334. Research in Applied Forecasting
344. Sales Management
345. Advertising
355. Production Management
357. Methods Study
358. Purchasing
365. Executive Control
375. Industrial Relations
380. Air and Ocean Transportation
388. Seminar in Transportation
390. Individual Research
391. Directed Reading
392. Ph.D. Thesis

Spring Quarter

301. Business and Professional Speaking
302. Business Activity and Public Welfare
304. The Law in Business Transactions II
312. Industrial Cost Control and Budgeting
313. Accounting Principles
316. Accounting Problems
328. Business Taxation
346. Foreign Trade
348. Marketing Research
359. Seminar in Small Business
361. Business Policy Formulation and Administration
362. Seminar in Business and Government
371. Seminar in Personnel Administration
377. Special Problems in Industrial Relations
384. Public Utilities
386. Seminar in Highway Transportation
387. Geography of Manufactures
390. Individual Research
391. Directed Reading
392. Ph.D. Thesis

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† The program for the summer quarter of 1955 will be announced later.

* Students entering the Graduate School of Business without previous work in business administration will register for Courses 200, 202, 212, and 260. Persons excused from Business 202 may take Business 204, 240 or 265. Persons excused from Business 212 may register for Business 220, 240, 265, or other appropriate course approved by the Dean.

FIRST-YEAR COURSES

200. **Sources of Business Information.**—This course is a study of the utility, to the businessman, of available information. A bibliography of the best business books and periodicals is utilized.
1 unit, autumn quarter (CUTLER)

202. **Business Economics.**—A study of those economic principles which have the most important bearing upon business management.
4 units, autumn quarter (KREPS)

204. **Managerial Economics.**—A study of the varied forms in which economic concepts appear in business operations, and the uses to which the tools of economic analyses are put in solving the policy problems that plague managerial decision making.
4 units, autumn quarter (KREPS)

212. **Management Accounting.**—This course deals with the more elementary aspects of the accounting organization and techniques constantly used in business concerns.
4 units, autumn quarter (NIELSEN)

213. **Cost Accounting.**—This is a continuation of Business 212 and applies primarily to cost accounting.
4 units, winter quarter (NIELSEN)

220. **Business Finance.**—Financial administration and its relation to other business functions. Problems and readings deal with promotion, forms of organization, corporate securities, financial planning, raising long-term and current capital. Prerequisite: Business 212, or equivalent.
4 units, winter quarter (DOUGALL)

221. **Business Finance.**—A continuation of Business 220. Topics include disposition of earnings, financing expansion, corporate reorganization, and other types of financial adjustments.
4 units, spring quarter (DOUGALL)

231. **Business Statistics.**—Basic methods of collecting and presenting data, and analysis of frequency distributions, time series, reliability, index numbers, and correlation as applied to business problems.
4 units, winter quarter (SPURR)

232. **Business Forecasting.**—Forecasting techniques are developed and applied to the current outlook, utilizing business cycle principles, statistical indexes, and the methods of forecasting services. Prerequisite: Business 231, or equivalent.
4 units, spring quarter (SPURR)

240. **Geographical Aspects of Business.**—Deals with place relationships, with special emphasis upon the potential advantages and handicaps of a particular section in locating a business.
4 units, autumn quarter (WHITE)

248. **Marketing.**—The purpose of this course is to acquaint students with distribution channels, policies, and methods in a variety of industries engaged in the marketing of consumers' goods and industrial products. Prerequisite: Business 212, or equivalent.
4 units, spring quarter (FAVILLE, KROEGER)

250. **Industrial Management.**—The purpose of this course is to give students a thorough grounding in the scientific principles of management, and a recognition of the need for an orderly, logical, analytical, and systematic handling of business problems.
4 units, spring quarter (HOLDEN, SHALLENBERGER)

260. **Business Organization and Management.**—This course acquaints students with the basic principles and functions of business organization and management. Business problems are discussed primarily from the viewpoint

of general as distinguished from departmental or divisional management. Visits are made to representative concerns, and reports are written on selected phases of business organization and management.
6 units, autumn quarter (PEDERSON)

265. General Transportation.—Course deals with rail, highway, air, and water transportation, taking the viewpoint of the businessman as shipper and taxpayer.
4 units, autumn quarter (GERMANE)

270. Psychological Aspects of Business.—Psychological problems and methods of solving them will be presented in the areas of personnel management, labor relations, and advertising and selling.
4 units, winter quarter (HARRELL)

SECOND-YEAR COURSES

301. Business and Professional Speaking.—This course includes a rapid review of parliamentary law in its application to committee meetings and small discussion groups; practice in the use of charts and visual aids in developing sales talks and other forms of persuasive address; the use of the radio; speeches for various occasions.
4 units, winter and *spring quarters (CHAPIN AND STAFF)

302. Business Activity and Public Welfare.—This course deals with such subjects as the businessman and his critics; the aims and social functions of business; and the contribution of business to international betterment. Prerequisite: Business 202, or equivalent.
4 units, spring quarter (KREPS)

303. The Law in Business Transactions.—A brief survey of the American system of law with particular reference to some of the fundamental legal concepts relating to business, especially as found in the law of contracts and quasi-contracts.
4 units, autumn and *winter quarters (RATHBUN)

304. The Law in Business Transactions. — A continuation of the study of legal aspects of business problems begun in Business 303. It deals with topics in the fields of agency, bailments, sales, and negotiable instruments. Prerequisite: Business 303, or equivalent.
4 units, winter and *spring quarters (RATHBUN)

306. Introduction to Business and Government.—This course deals with such topics as the rise of business; historical relations of business with government; the multiplication of contacts with government agencies; etc.
4 units, winter quarter (KREPS)

312. Industrial Cost Control and Budgeting.—In this course advanced problems of cost accounting will be studied, and relationship will be emphasized between cost accounting and budgetary control. Prerequisites: Business 212 and 213, or equivalents.
4 units, spring quarter (NIELSEN)

313. Accounting Theory.—An evaluation of certain major accounting theories in relation to the actual problem of accounting control in business. Prerequisites: Business 212 and 213, or equivalents.
4 units, summer quarter (NIELSEN)

314. Auditing.—The fundamental principles and technical procedures of auditing are presented. Prerequisites: Business 213, 221, and 260, or equivalents.
4 units, autumn quarter (JACKSON)

316. Accounting Problems.—It is the purpose of this course to train the student in a wide variety of complex and somewhat peculiar accounting problems and relationships. Prerequisites: Business 213, 221, and 303, or equivalents.
4 units, spring quarter (NIELSEN)

318. Accounting Organization and Comptrollership.—A study of the comptroller's place in the modern manufacturing or commercial enterprise. Prerequisites: Business 312, 313, or 314, and consent of instructor.
4 units, winter quarter (JACKSON)

321. Investments and Investment Institutions.—Analysis of the various forms of investments and securities, investment institutions, and of the principles of sound investments. Prerequisites: Business 213 and 221, or equivalents.
4 units, autumn quarter (DOUGALL)

322. Commercial Banking.—Credit analysis and bank administration are studied through readings and cases. Prerequisites: Business 202, 213, and 221, or equivalents. Business 321 recommended but not required.
4 units, autumn quarter (———)

323. Investment Research and Analysis.—Intensive study and analysis of industries and representative companies; individual work and seminar reports are stressed. Prerequisites: Business 213 and 321, or equivalents.
4 units, winter quarter (DOUGALL)

328. Business Taxation.—A survey of the various types of tax which have the greatest effect upon business is followed by consideration of the purposes for which taxes must be levied, the bases of assessment, and administrative procedure. Prerequisites: Business 213 and 221, or equivalents.
4 units, autumn and *spring quarters (YEO)

331. Business Research Methods.—Analysis of time series, index numbers, and simple and multiple correlation techniques applied to the better understanding of business fluctuations and relationships. Prerequisite: Business 231, or equivalent.
4 units, autumn quarter (SPURR)

332. Industry Analysis.—This course aims to develop systematic methods of analysis capable of revealing the dynamic and functional characteristics of an industry. Prerequisites: Business 231 and 232, or equivalents.
4 units, autumn quarter (SPURR) [Not given in 1954–55]

334. Research in Applied Forecasting.—Individual research projects in the practical application of dynamic analysis to business processes. Prerequisite: Business 331.
4 units, winter quarter (SPURR) [Not given in 1954–55]

336. Life Insurance.—A study of the family, business, and investment uses of life insurance, types of life insurance contracts, policy provisions, and elements of rate-making.
4 units, summer quarter (———)

337. Property and Casualty Insurance.—A study of insurance from the standpoint of the businessman who purchases and uses insurance.
4 units, summer quarter (———)

340. Marketing.—Consideration is given to such subjects as merchandising policy, sales management, brands and trade-marks, advertising, sales promotion, pricing, and marketing research. Prerequisite: Business 248, or equivalent.
4 units, autumn and *summer quarters (FAVILLE, KROEGER)

342. Retail Store Management.—The aim of this course is to develop the principles of management as applied to retail stores. Prerequisites: Business 212 and 248, or equivalents.
4 units, autumn quarter (FAVILLE)

344. Sales Management.—This course covers the important phases of sales administration, planning, and execution, as applied to manufacturers and wholesalers. Prerequisite: Business 340, or equivalent.
4 units, winter quarter (FAVILLE)

345. Advertising.—The approach is from the standpoint of the business executive who must appraise a program presented for his consideration and evaluate the advertising as a tool in sales promotion. Prerequisite: Business 340, or equivalent.
4 units, winter quarter (Kroeger)

346. Foreign Trade.—This course is intended to give a general understanding of business methods and problems in foreign trade. A previous course in marketing will be very helpful but is not required.
4 units, spring quarter (Germane)

348. Marketing Research.—This course provides training in research methods which may be specifically applied to the solution of marketing problems of interest to the sales manager. Prerequisites: Business 231, 248, and 340.
4 units, spring quarter (Kroeger)

350. Industrial Management.—This course is a continuation of Business 250. The same generic treatment of industrial management is followed, and practical problems supplement the general discussion. Prerequisite: Business 250, or equivalent.
4 units, autumn and *summer quarters (Holden, Shallenberger)

355. Production Management.—This course centers about the control of production, developing the relationship of those basic elements of production control—equipment, operatives, materials, and orders. Prerequisite: Business 350, or equivalent.
4 units, winter quarter (Holden)

356. Production Processes.—The object of this course is to provide a background in modern industrial processes, with a view toward improving the efficiency of production.
4 units, autumn quarter (Shallenberger)

357. Methods Study.—This course places particular emphasis upon work simplification and the development of production standards. Prerequisite: Business 356, or consent of instructor.
4 units, winter quarter (Shallenberger)

358. Purchasing.—In this course the basic principles and methods of procurement in industrial, merchandising, governmental, and institutional organizations are discussed.
4 units, winter quarter (Weber)

359. Seminar in Small Business.—A consideration of the management problems faced by operators of small business concerns.
4 units, spring quarter (Shallenberger)

361. Business Policy Formulation and Administration. — This course emphasizes the methods and problems involved in initiating a new business enterprise and in co-ordinating the specialized functions of a going enterprise.
4 units, spring quarter (Pederson)

362. Seminar in Business and Government.—Attention is concentrated on a special field such as the antitrust laws or national defense or on the adjustments of business to government in a special industry such as housing. Participants present seminar reports on special selected phases for class discussion. Prerequisite: Business 306, or consent of instructor.
4 units, spring quarter (Kreps)

365. Executive Control.—Executives must delegate responsibility and authority to have time available for their primary functions of planning, directing, and co-ordinating activities. The principles which underlie such operating controls will be covered in this course. Prerequisites: Business 250 and 350.
4 units, winter quarter (Holden)

370. Personnel Administration.—From the experiences of various business concerns the student formulates in a series of weekly reports the objectives

and resulting necessary procedures for a well-rounded personnel department of a particular company. Prerequisite: Business 270, or equivalent.
4 units, autumn quarter (HARRELL)

371. Seminar in Personnel Administration.—Reports by students covering an intensive study of one phase of personnel work.
4 units, spring quarter (HARRELL)

373. Human Relations.—The goal is to teach understanding and skill in dealing with people. Case studies will be discussed wherein there are interpersonal problems.
4 units, autumn quarter (HARRELL)

375. Industrial Relations.—A study of the developments which have shaped industrial government, and of the facts and forces which now influence the collective bargaining phases of employee relations in this country.
4 units, winter quarter (YODER)

376. Government Policy on Labor Relations.—An analysis of the problems posed by the impact of labor relations upon the public, and of the laws passed by state and federal governments to safeguard the public interest.
4 units, autumn quarter (———)

377. Special Problems in Industrial Relations.—An intensive study of certain phases—economic and legal—of industrial relations. Prerequisite: Business 375.
4 units, spring quarter (TROXELL) [Not given in 1954-55]

380. Air and Ocean Transportation.—This course deals with carrier management problems in operations, traffic, finance, control, human relations, and public policy.
4 units, winter quarter (GERMANE)

381. Highway and Railroad Transportation.—This course deals with carrier management problems such as choosing equipment, evaluating improvement proposals, rate making, competition and co-ordination, finance, labor relations, and government policy.
4 units, autumn quarter (GERMANE)

384. Public Utilities.—The interests of management and the public are considered in this course. Primary attention is given to electric, gas, telephone, and radio broadcasting companies.
4 units, spring quarter (GERMANE)

386. Seminar in Highway Transportation.—Emphasis will be placed on handling of personnel, selling transportation, government traffic, and legal and public relations. Prerequisites: Business 381 and consent of instructor.
4 units, spring quarter (———)

387. Geography of Manufactures.—A searching analysis of the principles underlying the location of industry.
4 units, spring quarter (WHITE)

388. Seminar in Transportation.—This seminar for advanced students will serve as a forum to consider important management and public policy problems in transportation. Consent of instructor necessary.
4 units, winter quarter (GERMANE)

390. Individual Research.—Superior students may, during their second year, carry on individual research on some special problem under the direction of one or more members of the faculty.
4 units, any quarter (FACULTY)

391. Directed Reading.—(Open to Ph.D. candidates only.)
4 units, any quarter (FACULTY)

392. Thesis.—(Open to Ph.D. candidates only.)
4 units or more, any quarter (FACULTY)

SECRETARIAL TRAINING

Autumn Quarter	*Winter Quarter*	*Spring Quarter*
107a. Shorthand I	107a. Shorthand I	107b. Shorthand II
108a. Typewriting I	107b. Shorthand II	107c. Shorthand III
108b. Typewriting II	108a. Typewriting I	108a. Typewriting I
108c. Typewriting III	108b. Typewriting II	108b. Typewriting II
	108c. Typewriting III	108c. Typewriting III

107a. Shorthand I.
3 units, autumn and *winter quarters (Wirtz)

107b. Shorthand II.
3 units, winter and *spring quarters (Wirtz)

107c. Shorthand III.
3 units, spring quarter (Wirtz)

108a. Typewriting I.
2 units, any quarter (Wirtz)

108b. Typewriting II.
2 units, any quarter (Wirtz)

108c. Typewriting III.
2 units, any quarter (Wirtz)

SCHOOL OF EDUCATION

Percy Erwin Davidson, Maud Merrill James, Jesse Brundage Sears, Professors of Education, Emeriti

Lewis Madison Terman, Professor of Psychology and Education, Emeritus

Warren D. Allen, Organist, and Professor of Music and Education, Emeritus

I. James Quillen, Professor of Education, and Dean of the School of Education

A. John Bartky, William Harold Cowley, Paul Robert Hanna, Lucien B. Kinney, William R. Odell, Professors of Education

Henry Bonner McDaniel, Professor of Education and Psychology

Quinn McNemar, Robert R. Sears, Professors of Psychology and Education

Maud Lombard Knapp, Professor of Physical Education and Education

Daniel Marcus Mendelowitz, Professor of Art and Education

Hugh Donald Winbigler, Professor of Speech Education, and Dean of Students

Oliver E. Byrd, Professor of Health Education

Edgar Bruce Wesley, Visiting Professor of Education

Robert Nelson Bush,† William J. Iverson, James David MacConnell, Fannie Raskin Shaftel, Lawrence Gregg Thomas, Associate Professors of Education

Arthur P. Coladarci, Associate Professor of Education and Psychology

Alfred H. Grommon, Associate Professor of Education and English

Ernest Paul Hunt, Associate Professor of Physical Education and Education

Daniel T. Dawson, Paul DeH. Hurd, Barry T. Jensen, Dale P. Wren, Assistant Professors of Education

John E. Nixon, Assistant Professor of Education and Physical Education

Isabel Magaña Schevill, Assistant Professor of Education and Spanish

Margaret Barr, Elwyn Bugge, Luell Weed Guthrie, Miriam B. Lidster, Marian S. Ruch, Assistant Professors of Physical Education and Education

Helen W. Schrader, Assistant Professor of Speech and Drama, and Education

George D. Spindler, Assistant Professor of Education, and Sociology and Anthropology

Henry A. Bamman, Elva Faye Brown, George W. Frasier, J. Russell Kent, Richard F. O'Brien, Ernest B. O'Byrne, Christine Ricker, Pauline S. Sears, Robert J. Wert, Virginia N. Woods, Lecturers in Education

[Members of the faculties of other divisions of the University giving courses or coöperating in the offerings of the School of Education are Virgil A. Anderson, Sylvia Cain, Everett S. Dean, Jack A. Weiershauser, Clifford F. Weigle.]

The School of Education is responsible for the preparation of teachers, supervisors, guidance workers, administrators, and other educational specialists. Five degrees are granted by the University with specialization in education:

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† Absent on leave 1954–55.

Bachelor of Arts, Master of Arts, Educational Specialist, Doctor of Education, and Doctor of Philosophy. Various teaching and educational service credentials are issued by state departments of education upon certification of the School that properly accredited work has been carried by the student. For California, the University grants credentials under authorization of the State Board of Education.

Acceptance of Work Done Elsewhere.—Students transferring with advanced or graduate standing from other universities may have substantially equivalent training accepted in lieu of the courses required at this University in education and in the major and minor fields.

The University offers no correspondence or extension courses.

SUMMER QUARTER

The School of Education has arranged its work for the summer quarter so that all instruction in education courses will terminate at the end of eight weeks. For some of the workshops and courses this eight-week term is divided into two four-week periods, with registration for the second period on Monday, July 25, 1955. Thus a flexible program is provided to accommodate students attending the full eight weeks, or for either of the four-week periods, and this makes it possible for the teacher or administrator to complete the quarter in time to open school in the fall. However, a full quarter of instruction will be offered in each course and a full quarter of residence may be counted for degrees. The number of units for which a student may register may not exceed sixteen unless part of the registration is for thesis, or unless one-half of the work is in courses outside of education and the student remains for the full ten weeks.

The outline below (pp. 34–50) describes the courses that will be offered during the coming academic year. Only such courses as can reasonably be scheduled at this time are listed for the summer quarter. The *Summer Quarter Bulletin* issued each year in February will contain more definite information.

DEGREE OF BACHELOR OF ARTS

The Bachelor of Arts in education is a pre-professional degree and may be obtained only by those who are candidates in good standing for one of the teaching credentials offered through the School of Education or who already hold a valid teaching credential. Normally, candidacy for the Bachelor of Arts degree in education is limited to those completing four years of one of the following five-year credential programs: (1) general elementary, (2) men's physical education, (3) women's physical education, and (4) health and hygiene. In a few special cases, some candidates for the General Secondary Credential are permitted to seek the Bachelor of Arts degree in education while completing requirements in certain academic departments for a teaching major and a minor or for two teaching minors. Students desiring to become candidates for this degree in connection with their preparation for one of the above types of teaching credentials should begin their relationship with the School during spring quarter of their sophomore year, at which time the Dean's office will assign each student to the appropriate adviser.

To qualify for the Bachelor of Arts degree in education, the student must meet the following requirements: (1) be approved by a faculty committee as a candidate for one of the five types of teaching credentials named above or be a holder of a valid teaching credential; (2) complete 25 units with an average grade of C or better selected from courses outside the School in fields comprising the scientific bases of education (anthropology, sociology, psychology, hygiene, and human biology); (3) complete 12 units with an average grade of C or better from courses in the educational foundations offered within the School; (4) complete 30 units of courses outside the School in the area of the student's teaching interest.

(Further details covering the general University requirements for the degree of Bachelor of Arts will be found in the *Information Bulletin.*)

GRADUATE DEGREES

Basis of Acceptance as Candidates for Advanced Degrees in Education.—Students who have been admitted to graduate standing at Stanford University should apply, during their first quarter in residence, for admission to the graduate program in the School of Education. Admittance to graduate standing by the University does not in itself constitute admission to candidacy for advanced degrees in the School of Education.

Students working toward graduate degrees should follow the suggestions outlined under each degree. Students applying for the Masters', Educational Specialists', or Doctors' degrees will present a preliminary program of study which represents the work to be completed while working toward the degrees.

Students will consult their advisers with regard to organizing their graduate programs within the limits described in this bulletin.

[Note.—Students who are candidates for the degrees of Master of Arts and Doctor of Philosophy should consult also the *Information Bulletin* concerning the program and requirements for these degrees.]

Field of Concentration for Advanced Degrees.—Candidates for advanced degrees in education should plan to specialize in the field of their professional interest, preparing for some line of professional activity and at the same time securing mastery of an organized body of knowledge. The choice should be made in light of the professional objective of the student. The program of study for the various fields of concentration is somewhat flexible, allowing a student, in consultation with his adviser, to emphasize certain aspects of the work, depending on his special interests and his professional objective. Candidates will select one of the faculty advisers to serve them in planning their program of study and in projecting plans for investigation for the dissertation. Other members of the faculty of the School of Education may also be consulted with regard to the particular field chosen by the student. Each program as finally approved will designate one area of special interest as a major field of concentration.

The fields of concentration for the Educational Specialist, Doctor of Education, and Doctor of Philosophy degrees are listed below. Members of the faculty of the School of Education who teach courses that fall within a particular field may serve as advisers to students who have selected that field of concentration.

General School Administration
Elementary Education
Secondary Education
Higher Education
Junior College Education

Teacher Education (with any of the following fields of concentration):

- Art
- Business Education
- Foreign Languages
- Language Arts or English
- Mathematics
- Music
- Physical Education
- Science
- Social Studies
- Speech and Drama
- Audio-Visual

[In these concentrations the candidate should write his intention as: *Art: Teacher Education.*]

Educational Sociology
Educational Psychology
Philosophy of Education
Philosophy of Education and History of Education
Philosophy of Education and Comparative Education
Health Education
Guidance
General Curriculum

Special Curriculum (with any of the following fields of concentration):

Art
Business Education
Foreign Languages
Health Education
Journalism
Language Arts or English
Mathematics
Music
Physical Education
Science
Social Studies
Speech and Drama

[In these concentrations the candidate should write his intention as: *Art: Special Curriculum.*]

Other possible fields of concentration may be arranged for individual advanced graduate candidates when approved by both the student's adviser and the Committee on Advanced Graduate Degrees of the School.

Preliminary application for all advanced degrees is required. This application is to be obtained at the office of the School of Education, and comes before a committee of the faculty for consideration.

Degree of Master of Arts

The program for the degree of Master of Arts in education provides for a common core of training for all candidates for the degree, and for specialization in the selected fields of concentration which follow:

Elementary Education
Secondary Education (with specializations to be designated)
Student Personnel and Counseling
Health Education
Physical Education

Other possible fields of concentration may be arranged for individual advanced graduate candidates when approved by both the student's adviser and the Master of Arts Committee of the School. The core program should include work in educational sociology, educational psychology, educational hygiene, history of education, philosophy of education, administration, guidance and curriculum. Courses presented for core requirements must have been taken within five years of the date of the preliminary application. The remaining courses pursued shall be determined by the candidate and the adviser. Graduate course work taken seven or more years before the date of formal application will be evaluated by the adviser and the Master of Arts Committee, and additional course work in the foundation fields will be required in certain cases.

General requirements for the completion of the degree of Master of Arts (A.M.) include:

1. Forty-five units of graduate study beyond the Bachelor's degree to be completed at Stanford. In no case will the degree be granted unless the student has been registered at Stanford University for three full quarters, or the equivalent, after the conferring of the Bachelor's degree. Evaluation of residence is based on tuition payments. (The summer quarter is considered a full-time quarter if at least 12 units are taken.) One full-time quarter (a minimum of 12 units) is required. The remainder of the work may be carried on a part-time basis.

2. Preliminary application materials, listed below, to be submitted to the School of Education two quarters before the conferring of the degree:
   - *a*) Transcripts of all academic work previously taken.
   - *b*) A proposed program of courses for the degree, signed by the adviser.
   - *c*) Graduate Record Examination score (Scholastic Aptitude Section).
3. Satisfaction of all requirements for the degree within four years after formal application for the degree has been accepted.
4. Completion of 6 quarter units of student teaching or other appropriate practicum, or one year of teaching experience.
5. Recommendation from the adviser and the Master of Arts Committee that the degree be granted.

The degree of Master of Arts (A.M.) is conferred by the University, on recommendation of the Committee on Graduate Study.

Three types of programs are offered leading to the degree of Master of Arts in education:

1. Research type: Three bound copies of a thesis are filed with the Registrar's Office. Recommended for future doctoral candidates, research workers, and college teachers of education.
2. Internship type: A project carried on during internship is filed with the School of Education at the close of the year of teaching. Planned for elementary and secondary school teachers.
3. School Specialist type: No thesis. Planned for elementary and secondary school teachers, administrators, guidance workers, etc.

Current advisers, programs of study, and order of procedure should be obtained from the School of Education credential secretary during registration day in the first quarter of residence.

Degree of Educational Specialist

The degree of Educational Specialist (Ed.S.) is conferred upon recommendation of the faculty of the School of Education and the University Committee on Graduate Study, on students who complete satisfactorily the program of advanced study in education, as outlined by the faculty of the School of Education, and present a written report of some substantial educational project selected in conference with an adviser. This project will be based on some problem of importance in the candidate's area of specialization and it must be read and approved by the adviser of the candidate. This program involves a minimum of two years of graduate study, one of which must be done at Stanford.

This degree will provide an intermediate program of specialized training in education between the Master of Arts degree and the Doctor of Education and Doctor of Philosophy degrees. The degree program will provide school administrators, supervisors, curriculum directors, guidance workers, and others with the opportunity for intensive training within their fields of specialization. When the degree is granted, the diploma will indicate the areas of specialization of the candidate. For example, the diploma of a candidate in the field of school administration will read "Educational Specialist in School Administration."

Encouragement to study for the degree is based upon a preliminary conference with the Committee on Advanced Graduate Degrees of the School of Education. This committee will use all available evidence relative to the candidate's fitness to enter upon the program.

After preliminary admission to candidacy the work of the student progresses under the guidance of an adviser chosen by the student from the representatives of the faculty in the candidate's field of concentration.

(For complete information regarding requirements for the Ed.S. degree, consult the School of Education Manual on Advanced Graduate Degrees.)

DEGREE OF DOCTOR OF EDUCATION

The degree of Doctor of Education (Ed.D.) is a professional degree conferred by the University on recommendation of the faculty of the School of Education and the Committee on Graduate Study.

Residence.—Nine quarters of graduate study (135 units) beyond the baccalaureate degree are required for the doctorate, of which one full quarter (a minimum of 12 quarter units) must be outside the field of education. Evaluation of Stanford residence is based on tuition payments. Candidates for the degree will be required during the course of work to register at Stanford for a minimum of one academic year (three quarters). Two of these quarters must be in consecutive full-time residence. All requirements for the degree must be completed within four years after the candidate has passed his qualifying examinations. Graduate course work beyond the Master's degree taken seven or more years ago will not ordinarily be included in the doctoral program. Applicants forty-five years of age and over are not admitted to the doctoral program in education.

Organization of Program.—Candidates for the Ed.D. degree will be expected to organize their program in conference with an adviser in their field of concentration. The adviser will make recommendations to the Committee on Advanced Graduate Degrees in connection with application for candidacy, will aid in planning, will approve the program of the individual, and will function as adviser on research for thesis. The adviser will be aided by other members of the faculty in the direction of the research program. Students desiring to change advisers may make application to the Committee on Advanced Graduate Degrees.

Complete information concerning the organization of this program can be secured from the Dean of the School of Education.

DEGREE OF DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy (Ph.D.) is conferred by the University on recommendation of the Committee on Graduate Study. Students working toward this degree in the School of Education are ordinarily preparing for the direction of research work in public-school systems or in specialized institutions, or are preparing to conduct research in connection with college teaching, and prefer this route to their objective rather than the Ed.D. degree.

Residence.—Nine quarters of graduate study (135 units) beyond the baccalaureate degree are required for the doctorate, of which 45 units must be in a minor field if the candidate does not hold a Master's degree outside the field of education. Evaluation of Stanford residence is based on tuition payments. Candidates for the degree will be required during the course of work to register at Stanford for a minimum of one academic year (three quarters). Two of these quarters must be in consecutive full-time residence. All requirements for the degree must be completed within four years after the candidate has passed his final examinations. Graduate course work beyond the Master's degree taken seven or more years ago will not ordinarily be included in the doctoral program. Applicants forty-five years of age and over are not admitted to the doctoral program in education.

Organization of Program.—Much the same flexibility is allowed in projecting a program for the Ph.D. degree as for the Ed.D. degree. The candidate will be expected to organize his program of work for the degree in conference with an adviser in his field of concentration selected by the student.

Complete information concerning the organization of this program can be secured from the Dean of the School of Education.

Ph.D. Minor.—Candidates for the Ph.D. degree in other departments or schools of the University who elect a minor in education will be expected to choose a field of concentration and to have fundamental grounding in certain foundation fields. They will be required to take a minimum of 30 units in graduate courses in education. In the organization of his program, the student who applies for a minor in the School of Education will consult with an adviser in education and the Committee on Ph.D. Minors of the School of Education.

CREDENTIALS FOR PUBLIC-SCHOOL SERVICE

The University acts as agent for the State Department of Education in granting credentials for service in the California public schools, and also recommends to the proper educational authorities in other states that such credentials be issued.

Persons desiring to secure credentials through Stanford University are required, at the beginning of their training program, to present evidence of their qualifications to a Committee on Credentials. The function of the Committee is to encourage those applicants who, in the judgment of the Committee, are qualified to pursue the program. The credential secretary in the School of Education should be consulted as to the necessary procedure.

A candidate for any type of Stanford credential must complete the equivalent of one full year's work (three quarters) at the University. For the General Elementary, General Secondary, and Junior College Credentials two of the quarters must be devoted to full-time study; for the administration credentials one quarter must be devoted to full-time study. The remaining work (to total at least 39 units) may be taken on a part-time basis by those candidates who are eligible for such type of registration. The program carried will depend upon the teaching-major and -minor and the professional objective of the candidate.

ADMINISTRATION AND SUPERVISION CREDENTIALS

The Stanford School of Education is authorized to recommend applicants for the following administration credentials:

The General Administration Credential, which authorizes the holder to administer and supervise schools as a superintendent, deputy superintendent, or assistant superintendent, principal, vice-principal, supervisor, or curriculum co-ordinator, in secondary or elementary schools.

The Secondary School Administration Credential, which authorizes the holder to administer and supervise a secondary school as superintendent, deputy superintendent, assistant superintendent, principal, vice-principal, supervisor, or curriculum co-ordinator.

The Secondary School Supervision Credential, which authorizes the holder to supervise or co-ordinate instruction in the secondary schools.

The Elementary School Administration Credential, which authorizes the holder to administer and supervise elementary schools as superintendent, deputy superintendent, assistant superintendent, principal, vice-principal, supervisor, or curriculum co-ordinator.

The Elementary School Supervision Credential, which authorizes the holder to supervise or co-ordinate instruction in elementary schools.

GENERAL REQUIREMENTS

An applicant for an administration credential must submit:

1. A full year of study at Stanford University (a minimum of 39 quarter units) of which one quarter must be given to full-time residence.
2. A certificate from a physician that the applicant is physically and mentally fit to engage in school work.
3. A program of study approved by the adviser in the School of Education and filed with the School of Education credential secretary.
4. Verification of two years of experience at the appropriate level.
5. Qualifications for the basic teaching credential required.

Current advisers, programs of study, and order of procedure should be obtained from the credential secretary in the School of Education on or shortly after registration day in the first quarter of residence.

TEACHING CREDENTIALS

The Stanford School of Education is authorized by the State of California to recommend candidates for the following teaching credentials:

The General Elementary Credential, which authorizes the holder to teach any or all subjects in all grades of any elementary school, including kindergarten.

The General Secondary Credential, which authorizes the holder to teach any or all subjects (with the exception of classes organized under the provisions of the federal and state vocational education acts) in all grades of any junior college, senior high school, four-year high school, junior high school, or the seventh and eighth grades of elementary schools.

The Junior College Credential, which authorizes the holder to teach any or all subjects in all grades of any junior college.

Candidates for teaching credentials must present evidence of meeting standards in the following:

a) *Physical Examination.* A certificate of mental and physical fitness from the University Health Service.

b) *Speech Competency.* Approval of candidate's competency in oral expression. The usual method of satisfying this requirement is by enrollment in the course Speech for Teachers (Speech 115).

c) *Fulfillment of the Constitution Requirement,* either by passing an examination or by taking satisfactory course work. Any one of the following courses at Stanford will satisfy this requirement:

   History 120, 121, 163
   Political Science 1 or 171

d) *Audio-Visual Requirement*—3 quarter units or equivalent. All credential candidates are required to take Education 241a before student teaching. Graduate transfers who are exempt from Education 115 or 246 must enroll in Education 251 (Tests and Evaluation) and 241 (Audio-Visual Education).

e) *Approval by the Committee on Credentials* based on scholarship and other requisites for successful teaching.

The lists of requirements for teaching credentials are available from the School of Education credential secretary upon request.

EXEMPTION FROM STUDENT TEACHING

Part of the student teaching requirement may be waived for one year of successful teaching or student teaching elsewhere after satisfactorily completing half of the student teaching requirement at Stanford. Such a waiver does not imply granting of credit. Course work must be substituted for exemptions in order to have the required number of education units.

Current advisers, programs of study, and order of procedure should be obtained from the credential secretary in the School of Education on registration day in the first quarter of residence.

A brief summary of the three general credentials follows.

GENERAL ELEMENTARY CREDENTIAL

A program of work for the California General Elementary Credential has been arranged whereby students may complete work for this credential at the time of receiving the Master's degree from this University. Students desiring to follow this program should apply in the spring quarter of the sophomore year. Only a limited number of students (at present, about 40 a year) are accepted into the General Elementary program. The program requires the completion of one year of graduate work.

GENERAL SECONDARY CREDENTIAL

The California State Department of Education made effective on September 1, 1951, the following requirements for the General Secondary Credential:

A. Sixty quarter units of general education with a minimum of 9 quarter units in each of the following:

1. Science and mathematics. (The Stanford Lower Division program fulfills this requirement.)
2. The practical arts and the fine arts, such as music, art, homemaking, health education, physical education, industrial arts, and similar fields. (Courses in art and music are recommended to Stanford undergraduates.)
3. Social Studies. (The Stanford Lower Division program fulfills this requirement.)
4. The communicative arts, such as languages, literature, speech. (The Stanford Lower Division program fulfills this requirement. Candidates for the credential, however, are required to take also Speech 115.)

B. Thirty-three quarter units of professional work in education, including the following:

1. The scope and function of the secondary school.
2. Human growth and development; the learning process; mental hygiene or personality development.
3. Counseling and guidance.
4. Curriculum; methods; evaluating of instruction at the secondary school level.
5. Nine quarter units of directed teaching.

To qualify for the Stanford General Secondary Credential, the candidate must complete the following:

A. At least 60 quarter units of courses that will fulfill the state's requirement in general education.

B. At least 34 quarter units in the following professional courses (or their equivalent).

		Units
110.	Social Foundations of Education	5
115.	Psychological Foundations of Education	5
118.	Health Foundations of Education	3
246.	The American Secondary School	3
247a.	Participation and Observation in Secondary Teaching	3
	Curriculum and Instruction in Teaching Major	6
247b.	Student Teaching in Secondary Schools	9
		34

C. At least 40 quarter units at Stanford in graduate standing, with an academic average of B— or above. One-third of the units must be in courses numbered 200 or above. For two quarters of this work, the candidate must be enrolled for full-time study.

D. A teaching major and teaching minor, as specified by the academic department. Candidates who are required to take a course in the methods of teaching their minor are urged to schedule this course in the Autumn Quarter of their senior year. Requirements for specific majors and minors, not listed in this *Announcement* by departments, may be obtained from the credential secretary of the School of Education.

Junior College Credential

A. *Completion of Professional Course Requirements,* which include a course dealing with the aims and scope of the junior college, practice teaching, and a course in methods.

B. *Completion of the Master of Arts degree.*

C. *Completion of a teaching major and a teaching minor satisfactory to the department recommending the credential.*

COURSES IN OTHER DIVISIONS OF THE UNIVERSITY

It is desirable that workers in education have thorough backgrounds in areas outside of professional work. Students are therefore urged to consider the courses offered in other divisions of the University in planning their programs.

COURSES IN EDUCATION

Upper Division Courses: 100–199
Graduate Courses: 200–299
Courses for Experienced Teachers or Advanced Graduates: 300–399
Seminars and Individual Study for Advanced Graduates: 400–499

The various fields in education courses are distributed as follows:

Foundations of Education (Digits 00–19), i.e., 118, Health Foundations of Education
Administration (Digits 20–29), i.e., 320, Public School Administration
Guidance and Personnel (Digits 30–39), i.e., 430, Seminar-Problems in Educational and Vocational Guidance
General Curriculum and Methods (Digits 40–49), i.e., 244, Curriculum and Instruction in Elementary Schools III
Testing Evaluation and Research (Digits 50–54), i.e., 251, Educational Testing and Evaluation
Physical Education (Digits 55–79), i.e., 155, Elementary Analysis of Body Movements
Special Curriculum and Instruction in Other Fields (Digits 80–99), i.e., 280, Curriculum and Instruction in Secondary Art

LOWER DIVISION

1. Introduction to the Study of Education.
3 units, winter quarter (O'BYRNE AND FRASIER) MTTh 11

UPPER DIVISION

[These courses are open to graduate students.]

110. Social Foundations of Education.—For credential and Master of Arts degree candidates.
5 units, autumn quarter (SPINDLER) MTWThF 10
5 units, *spring quarter (BARTKY) MTWThF 10
4 units, *summer quarter (SPINDLER) MTWThF 10

114. Methods and Practice in Church School Education.
3 units, autumn, *winter, and *spring quarters (WOODS) M 4–6 and Sunday 10:30–12

115. Psychological Foundations of Education.—Prerequisite: Psychology 51 or equivalent.
5 units, autumn quarter (JENSEN) MTWThF 9
5 units, *winter quarter (JENSEN) MTWThF 9
4 units, *summer quarter (JENSEN) MTWThF 10

116. Adolescent Development. (Same as Psychology 116.)
3 units, winter quarter (STOLZ)

118. Health Foundations of Education.
3 units, autumn quarter (BYRD) MTW 11
3 units, *winter quarter (BYRD) MTW 11

143. Observation in Elementary Schools.
3 units, autumn quarter (SEARS) M 8 (and by arrangement)

144a. Curriculum and Instruction in Elementary Schools.—Prerequisite: Admission to Elementary Program.
8 units, winter quarter (SHAFTEL AND HURD) MTWTh 10–12

144b. Curriculum and Instruction in Elementary Schools. Prerequisite: 144*a*.
8 units, spring quarter (DAWSON AND STAFF) MTWTh 10–12

180a. Art Activities for the Elementary School Teacher. (Basic experiences with art materials and methods for elementary teachers.) Laboratory course.
2 units, autumn quarter (HASKIN) By arrangement

180b. Art in Elementary Schools.—Lecture course on the development of children's artistic expression, and on elementary school classroom procedures.
2 units, spring quarter (MENDELOWITZ) TTh 2

198. Study of Planning Church School Curricula.—Prerequisite: Education 114.
3 units, autumn, *winter, and *spring quarters (WOODS) By arrangement

GRADUATE COURSES

[These courses are open to seniors with permission of adviser and instructor of course.]

200. History of Education.
3 units, autumn quarter (WESLEY) MWF 2
3 units, *winter quarter (WESLEY) W 7–10 P.M.
4 units, *summer quarter (WESLEY) MTWThF 1

204. Philosophy of Education.—A study of philosophical issues in epistemology, value theory, and metaphysics of significance to educational policy and practice. No previous study of philosophy is assumed.
4 units, autumn quarter (THOMAS) MTh 7–9 P.M.
4 units, *winter quarter (THOMAS) MW 2–4
4 units, *spring quarter (THOMAS) MTWTh 11
4 units, *summer quarter (THOMAS) MTWThF 9

206. Comparative Education.
4 units, summer quarter (———) MTWThF 2

216. Statistical Analysis in Education.—This course or its equivalent is required of all doctoral candidates unless specifically waived by the adviser.
4 units, winter quarter (COLADARCI) MTWTh 11
4 units, *summer quarter (COLADARCI) MTWThF 9

218. Administration of School Health Program.
3 units, spring quarter (BYRD) W 7–10 P.M.
4 units, *summer quarter (BYRD) MTWThF 9

239a, b. Study Skills and Developmental Reading in College.
4 units, autumn, *winter, and *spring quarters (BAMMAN) By arrangement

241. Audio-Visual Aids. Primarily for transfer students and experienced teachers.
3 units, spring quarter (HURD) Saturday 9–12
4 units, *summer quarter (HURD) MTWThF 8

241a. Audio-Visual Laboratory. Required of all credential candidates before student teaching.
1 unit, autumn and *winter quarters (HURD) MW 3, 4

242. Student Teaching Speech Correction.
3 units, autumn, *winter, and *spring quarters (ANDERSON-NEWBY) By arrangement

243. Guided Observation in Demonstration School.
4 units, summer quarter (CHRISTIANSEN) By arrangement

244. Survey of Elementary Curriculum.
4 units, summer quarter (———) MTWThF 9

244c. Curriculum and Instruction in Elementary Schools.—Prerequisite: 144*a* and 144*b*.
4 units, spring quarter (———) MW 1–3

245a. Elementary Student Teaching I.—Prerequisite: Admission to Elementary Credential program.
8 units, autumn quarter (DAWSON AND STAFF) M 4 (and by arrangement)

245b. Elementary Student Teaching II.—Prerequisite: 245*a* and admission to Elementary Credential program.
16 units, winter quarter (STAFF) W 4 (and by arrangement)

246. The American Secondary School.—Prerequisites: Education 110, 115, and approval of Committee on Teaching Credentials.
3 units, autumn and *winter quarters (WREN) MWF 9

247a. Participation and Observation in Secondary Teaching.—Prerequisites: Education 110, 115, and approval of Committee on Teaching Credentials.
3 units, autumn, *winter, and *spring quarters (GROMMON) T 8

247b. Student Teaching in Secondary Schools.—Prerequisites: Adequate preparation in teaching major and minor, Education 246, 247a, and approval by Committee on Teaching Credentials. Prerequisite or parallel: methods course in the teaching major.
9 units, autumn, *winter, and *spring quarters (WREN AND STAFF)
M 4–6 (and by arrangement)

248. Student Teaching in Junior College.
9 units, autumn, *winter, and *spring quarters (UNIVERSITY STAFF) By arrangement

251. Educational Testing and Evaluation.
3 units, winter quarter (O'BRIEN) Th 7–10 P.M.
4 units, *summer quarter (O'BRIEN) MTWThF 1

280. Curriculum and Instruction in Secondary Art.
4 units, autumn quarter (MENDELOWITZ) MWF 11

281a. Curriculum and Instruction in Business Education I.
4 units, autumn quarter (WREN) TTh 2–4

281b. Curriculum and Instruction in Business Education II.
2 units, winter quarter (WREN) Th 4–6

282a. Curriculum and Instruction in Foreign Languages I.
4 units, autumn quarter (SCHEVILL) TTh 4–6

282b. Curriculum and Instruction in Foreign Languages II.
2 units, winter quarter (SCHEVILL) T 4–6

283. Spanish for Elementary Teachers.—An intensive course designed to prepare teachers of elementary schools to teach the elements of Spanish pronunciation and conversation in grades four through six. No language prerequisites.
3 units, spring quarter (SCHEVILL) M 7–10 P.M.

284. Curriculum and Instruction in Secondary English.
4 units, summer quarter (GROMMON) MTWThF 8

284a. Curriculum and Instruction in Secondary English I.
4 units, autumn quarter (GROMMON) WF 4–6

284b. Curriculum and Instruction in Secondary English II.
2 units, winter quarter (GROMMON) W 4–6

284c. Teaching Adolescents' Literature.
2 units, spring quarter (GROMMON) W 4–6

285. Curriculum and Instruction in Journalistic Writing.
4 units, autumn, *winter, and *spring quarters (WEIGLE) By arrangement
4 units, *summer quarter (———) By arrangement

286a. Curriculum and Instruction in Speech I.
4 units, autumn quarter (SCHRADER) TTh 4–6

286b. Curriculum and Instruction in Speech II.
2 units, winter quarter (SCHRADER) T 4–6

289. Curriculum and Instruction in Junior College.
4 units, autumn, *winter, and *spring quarters (UNIVERSITY STAFF) By arrangement

290. Curriculum and Instruction in Secondary Mathematics.
4 units, summer quarter (KINNEY) MTWThF 8

290a. Curriculum and Instruction in Secondary Mathematics I.
4 units, autumn quarter (KINNEY) WF 4–6

290b. Curriculum and Instruction in Secondary Mathematics II.
2 units, spring quarter (KINNEY) W 4–6

294. Curriculum and Instruction in Secondary School Science.
4 units, summer quarter (HURD) MTWThF 3

294a. Curriculum and Instruction in Secondary School Science I.
4 units, autumn quarter (HURD) TTh 4–6

294b. Curriculum and Instruction in Secondary School Science II.
2 units, winter quarter (HURD) T 4–6

296. Curriculum and Instruction in Secondary School Social Studies.
4 units; summer quarter (WESLEY) MTWThF 3

296a. Curriculum and Instruction in Secondary Social Studies I.
4 units, autumn quarter (WESLEY) TTh 4–6

296b. Curriculum and Instruction in Secondary Social Studies II.
2 units, winter quarter (WESLEY) T 4–6

299. Reading in the Elementary and Secondary Schools.
4 units, summer quarter (———) MTWThF 8

COURSES FOR EXPERIENCED TEACHERS OR ADVANCED GRADUATE STUDENTS

305. Social Philosophies of Education.—The construction of a democratic theory of education from the conflicting views of fascism, communism, individualism and pragmatic liberalism.
4 units, winter quarter (THOMAS) TTh 2–4
4 units, *summer quarter (THOMAS) MTWTh 11

307. Teachers College in America.
[Not given in 1954–55]

309. The Structures of Higher Education.
4 units, winter quarter (COWLEY) MW 2–4

310. Social Foundations of Education.—For Ed.S., Ed.D., and Ph.D. degree candidates.

4 units, winter quarter (QUILLEN) MTWTh 10

4 units, *summer quarter (QUILLEN) MTWThF 10

311. International Understanding and Intergroup Education.

4 units, summer quarter (———) MTWThF 9

312. Occupational Trends.—The current nature of the American labor force and the occupational structure; intended for vocational counselors and advanced students of educational sociology. Prerequisite: Education 110 or 310.

4 units, autumn quarter (THOMAS) TTh 3–5

314. Classroom Learning.—The relation of learning theory to educational theory and practice; an examination and appraisal, at an advanced level, of research relating to the various dimensions of development and learning; the derivation of principles and evaluative criteria for the educator's efforts to maximize student growth. Prerequisite: 115.

4 units, autumn quarter (JENSEN) MW 2–4

4 units, *summer quarter (JENSEN) MTWThF 1

315. Cultural Transmission.

3 units, winter quarter (SPINDLER) M 7–10

316. Psychological Assessment of the Individual.—Prerequisite: 115. Education 216 or equivalent is strongly recommended.

4 units, winter quarter (COLADARCI) MW 2–4

4 units, *summer quarter (COLADARCI) MTWThF 11

317. Mental Hygiene.—A review of theory and research relating to the individual and his behavior; an effort to increase understanding of self and others. Prerequisite: 115.

3 units, spring quarter (JENSEN) W 7–10 P.M.

319. Early Childhood Education.

4 units, autumn quarter (———) By arrangement

320. Public School Administration.

3 units, winter quarter (ODELL) W 7–10 P.M.

4 units, *summer quarter (ODELL) MTWThF 2

321. School Staff Personnel Problems.

4 units, summer quarter (BUSH) MTWThF 1

322. Secondary School Administration.

3 units, autumn quarter (BUSH) W 7–10 P.M.

323. Public School Law.

3 units, winter quarter (KENT) Th 7–10 P.M.

4 units, *summer quarter (KENT) MTWThF 4

324. Elementary School Administration.

3 units, autumn quarter (DAWSON) Th 7–10 P.M.

4 units, *summer quarter (DAWSON) MTWThF 8

325. School Planning.

3 units, winter quarter (STAFF) Sat. 9–12

4 units, *summer quarter (MACCONNELL) MW 3–5

326a. School Finance.

3 units, autumn quarter (KENT) M 7–10 P.M.

4 units, *summer quarter (KENT) MTWThF 3

326b. Public School Accounting.

3 units, winter quarter (KENT) M 7–10 P.M.

326c. Public School Purchasing.

3 units, spring quarter (KENT) M 7–10 P.M.

327. Community Relations.

4 units, summer quarter (MACCONNELL) MTWThF 10

328a. Administration of Higher Education.

4 units, spring quarter (COWLEY) MW 2–4

4 units, *summer quarter (WERT) TTh 2–4

328b. Government of Higher Education.
4 units, autumn quarter (Wert) By arrangement

330. Guidance.
3 units, autumn quarter (McDaniel) TTh 4–5:30

330a. Guidance in Elementary Schools.
3 units, spring quarter (Sears) TTh 4–5:30
4 units, *summer quarter (Sears) MTWThF 11

330b. Guidance in Secondary Schools.
4 units, summer quarter (———) MTWThF 1

331. Inservice Personnel Training.—Open only to assistants in the residence program and directed by the staff of the Counselor for Women.
2 units, autumn and *winter quarters (Brown and staff) Th 1–3

333a. Counseling Techniques.
4 units, autumn quarter (McDaniel) MW 1–3
4 units, *winter quarter (Jensen) MW 1–3

333b. Counseling Techniques Practicum.
4 units, spring quarter (McDaniel) MW 2–4

337. Workshop in Diagnosis and Treatment of Reading Difficulties.
8 units, summer quarter (Bamman) MTWThF 8 (and by arrangement)

338. Student Personnel Services in Higher Education.
4 units, spring quarter (O'Byrne) By arrangement
4 units, *summer quarter (O'Byrne) MW 2–4

339a. Guidance Workshop I.
8 units, summer quarter (1st 4 weeks) (McDaniel) MTWThF 9–4

339b. Guidance Workshop II.
8 units, summer quarter (2nd 4 weeks) (McDaniel) MTWThF 9–4

340a. Curriculum Development.
4 units, winter quarter (Hanna) MTW 8–10
4 units, *summer quarter (Hanna) MTWThF 8

340b. Supervision.
3 units, spring quarter (Bartky) Th 7–10
4 units, *summer quarter (Bartky) MW 3–5 (and by arrangement)

341. The Applications of Radio and Television. (Same as Speech and Drama R201.)
2 units, summer quarter (Hurd, McGilvrey) T 1–3 and Th 1–2

342. Modern Methods in the Secondary School.
4 units, summer quarter (Wren) MTWThF 10

343. Secondary Curriculum, Instruction, and Supervision.
4 units, autumn quarter (Bush) MW 3–5

344. Elementary Curriculum, Instruction, and Supervision.
3 units, autumn quarter (Shaftel) W 7–10 P.M.
4 units, *summer quarter (Shaftel) MTWThF 11

345. Instruction in Higher Education.
4 units, winter quarter (Cowley) TTh 2–4
4 units, *summer quarter (Schevill) TTh 4–6

346. The Junior High School.
[Not given in 1954–55]

347. The Junior College.
3 units, winter quarter (Bartky) Th 7–10 P.M.
4 units, *summer quarter (Bartky) TTh 3–5 (and by arrangement)

348. The Curriculums of Higher Education.
4 units, autumn quarter (Cowley) MW 2–4

349. Professional Education of Teachers.
4 units, autumn quarter (Kinney) TTh 2–4
4 units, *summer quarter (Kinney) MTWThF 10

354. School Surveys.
3 units, autumn quarter (MacConnell) Sat. 9–12

381. Principles, Problems and Research in Business Education.

3 units, spring quarter (Wren) W 7–10

4 units, *summer quarter (Wren) MTWThF 8

386. Speech for Administrators.

4 units, summer quarter (Schrader) MTWThF 10

387. Elementary School Language Arts.

4 units, summer quarter (———) MTWThF 9

390. Elementary School Arithmetic.

4 units, spring quarter (Dawson) TTh 1–3

393. Elementary School Science.

4 units, summer quarter (Hurd) MTWThF 8

397. Elementary School Social Studies.

4 units, autumn quarter (Shaftel) MW 10–12

4 units, *summer quarter (Shaftel) MTWThF 9

398. Reading in Secondary Schools.

[Not given in 1954–55]

399. Reading in Elementary Schools.

[Not given in 1954–55]

SEMINARS AND INDIVIDUAL STUDY FOR ADVANCED GRADUATE STUDENTS

400. Seminar in History of Education.

4 units, spring quarter (Wesley) MTWTh 2

400i. Individual Study in the History of Education.

(Wesley)

404. Seminar in the Philosophy of Education.—Prerequisite: Education 204 or consent of the instructor.

3 units, spring quarter (Thomas) M 7–10 P.M.

404i. Individual Study in the Philosophy of Education.

(Thomas)

410i. Individual Study in Social Foundations of Education.

(Quillen)

411. Seminar in Citizenship Education.

4 units, spring quarter (Quillen) MW 4–6

415. Seminar in Educational Psychology and Guidance.—A topical seminar for advanced majors in Educational Psychology, Guidance, and Psychology. Prerequisites: advanced standing and 216 or its equivalent.

4 units, autumn quarter (Coladarci) By arrangement

4 units, *spring quarter (Coladarci) By arrangement

415i. Individual Study in Educational Psychology.

(Coladarci)

416. Seminar in Social Anthropology in Education.—Prerequisite: permission of instructor.

3 units, autumn quarter (Spindler) F 3–6

419. Seminar in Human Relations in the School.

4 units, spring quarter (Bush) MW 2–4

422. Seminar in Administration.

3 units, autumn and *winter quarters (Odell) W 7–10 P.M.

422i. Individual Study in Administration.

(Odell)

425. Field Practice in Elementary Schools.

6 units, autumn and *spring quarters (Kent and staff) Sat. 9–12

427. Field Practice in Secondary Schools.

6 units, autumn, *winter, and *spring quarters (Kent and staff) By arrangement

428. Seminar in School Planning.

3 units, autumn quarter (MacConnell) Th 7–10 P.M.

3 units, *winter and *spring quarters (Staff) T 7–10 P.M.

430. Seminar in Problems in Educational and Vocational Guidance.
4 units, spring quarter (Jensen) MW 9–11

430i. Individual Study in Educational and Vocational Guidance.
(McDaniel)

441i. Individual Study in Audio-Visual Education.
(Hurd)

443. Seminar in Supervision and Inservice Education.
4 units, winter quarter (Bartky) MWTh 4:30–6

443i. Individual Study in Supervision and Inservice Education.
(Bartky)

444. Seminar in Elementary Education.
2–10 units, autumn quarter (Shaftel) M 1–3
2–10 units, *winter quarter (Shaftel) MW 1–3
2–10 units, *spring quarter (Hanna) MW 10–12
2–10 units, *summer quarter (Hanna) MW 2–4

444i. Individual Study in Elementary Education.
(Hanna, Shaftel, Dawson)

446. Seminar in Secondary Education.
3 units, spring quarter (Bush) MW 4–5:30
4 units, *summer quarter (Bush) MTWThF 2–3

446i. Individual Study in Secondary Education.
(Bush)

447. Practicum in Secondary Education.—This course for doctoral students only is designed to provide opportunity under the direct supervision of a member of the regular staff for work in the teacher, supervisor, and administrator education program of the university. It may be taken during more than one quarter for a maximum total of 15 units. In addition to the individual work of each student in the practicum, a weekly discussion and co-ordinating seminar will be held at which time all of the students and the staff members involved will be in attendance. This course is a required part of the program of all majors in Secondary Education, Teacher Education (Secondary), and the special fields in Secondary Curriculum, such as English, Science, Mathematics.
3–5 units, autumn, *winter, and *spring quarters (Bush and staff) By arrangement

448. Seminar in Higher Education.
[Not given in 1954–55]

448i. Individual Study in Higher Education.
(Cowley)

449. Seminar in Teacher Education.
3 units, spring quarter (Kinney) Sat. 9–12 (and by arrangement)

449i. Individual Study in Teacher Education.
(Kinney)

450c. Advanced Graduate Students' Seminar.
No credit, autumn quarter (McDaniel) M 4–6
No credit, *winter quarter (Staff) M 4–6
No credit, *spring quarter (McDaniel) M 4–6
No credit, *summer quarter (McDaniel) M 7–10 p.m.

451. Master of Arts Research.
1–10 units, any quarter (Spindler)

453. Doctoral Dissertation.
1–30 units, any quarter (School Faculty)

454. Research Methodology.—Prerequisites: Consent of candidate's adviser; 216 strongly recommended.
4 units, autumn quarter (Coladarci) MTh 10–12
4 units, spring quarter (Coladarci) MW 10–12

480i. Individual Study in Curriculum and Instruction in Art.
(Mendelowitz)

482i. Individual Study in Curriculum and Instruction in Modern Languages.
(Schevill)

484i. Individual Study in Curriculum and Instruction in English.
(Grommon)

486i. Individual Study in Curriculum and Instruction in Speech and Drama.
(Schrader)

490i. Individual Study in Curriculum and Instruction in Mathematics.
(Kinney, Dawson)

494i. Individual Study in Curriculum and Instruction in Science.
(Hurd)

496. Seminar in Curriculum and Instruction in Social Science.
[Not given in 1954–55]

496i. Individual Study in Curriculum and Instruction in Social Science.
(Quillen, ———)

Physical Education

[Courses 155–159 are open to both men and women; Courses 160–169, to women only; Courses 171–175, to men only.]

155. Elementary Analysis of Body Movement.
2 units, autumn and *spring quarters (Ruch) TTh 8

156. History and Principles of Physical Education. — Prerequisite: Education 155.
3 or 4 units, autumn quarter (Knapp) MWF 9 and Th 11

157. The Elementary School Program in Physical Education.
4 units, winter quarter (Knapp and staff) MTWThF 8

158. Community Recreation.
3 units, winter quarter (Nixon) MWF 9

159. Tests and Measurements in Physical Education.
3 units, autumn quarter (Nixon) MWF 8

160. History of the Dance.—Prerequisites: third-year standing, and at least two quarters of modern dance or consent of the instructor.
3 units, spring quarter (Lidster) TWF 11

161. Teaching Progressions in Sports.—Prerequisite for all teaching progressions: Education 155 (may be taken concurrently), and average skill in the activities.

161a. Basketball, Badminton, Gymnastics, and Tumbling.
3 units, winter quarter (———) MTWTh 10

161b. Archery, Tennis.
2 units, spring quarter (Barr, Guthrie) WF 10

161c. Soccer, Speedball, Hockey, Volleyball.
3 units, autumn quarter (Barr and staff) MTWTh 10

161d. Softball, Swimming.—Prerequisite: Senior Life Saving (may be taken concurrently).
3 units, spring quarter (———) (Softball) TTh 10
(Swimming) By arrangement

161e. Golf.
1 unit, spring quarter (Cain) M 10

162a. Camp Counselor Training.—Six hours laboratory per week. Prerequisite: Upper Division standing, or consent of instructor.
2 units, spring quarter (Barr) M 3, W 3–6, or Th 3–6

162b. Girl Scout Training Course.
1 unit, autumn quarter (———) W 7:30–10 P.M.

163a. Teaching Progressions in Dance.—Modern dance including composition and percussion. (W16–17 taken concurrently MWF 2)
3 units, autumn quarter (DUGGAR) TTh 2, W 12

163b. Teaching Progressions in Dance.—Folk, square and social.
3 units, winter quarter (LIDSTER) TThF 11

164a. Posture and Orthopedic Problems.—Prerequisites: Anatomy 114, Education 169 (Kinesiology), and Physiology 113.
3 units, autumn quarter (RUCH) MWF 1

164b. Posture and Orthopedic Problems.—For majors in physical education. One conference; two to three hours laboratory.
2 or 3 units, winter quarter (RUCH) By arrangement

165. Choreography.—Fundamentals.
2 units, autumn quarter (DUGGAR) WF 1 (and by arrangement)

166. Choreography.—Dance forms.
2 units, winter quarter (DUGGAR) WF 1 (and by arrangement)

167. Choreography.—Production and accompaniment.
2 units (DUGGAR) Given by request

168. The Elementary School Program in Physical Education.—Prerequisite: Education 157.
2 or 3 units, spring quarter (KNAPP, BARR) By arrangement

169. Kinesiology.—Prerequisites: Education 155 and Anatomy 114.
4 units, spring quarter (RUCH) MWF 1–3

170. Introduction to Physical Education.
2 units, autumn quarter (NIXON) TTh 11

171. Special Methods Courses for Men: Courses in the Technique of Teaching Activities.—These courses are concerned with the methods and techniques of applied physical education and are open only to students enrolled for degrees or teaching credentials in physical education. Each course is planned and given by the director of the activity involved, with the assistance of his staff. Classroom presentations; graphic illustrations; field, court, and floor demonstrations. Admission only by permission of the instructor in charge of the course. Not open to first-year Lower Division students.

171a. Baseball Methods.—Two classroom and three field demonstration periods a week.
3 units, winter quarter (DEAN) MWTh 11

171b. Basketball Methods.—Two classroom and three court demonstration periods weekly.
3 units, autumn quarter (———) MWF 8

171c. Football Methods.—Two classroom and three field demonstration periods a week.
3 units, spring quarter (TAYLOR) TTh 8 (and by arrangement)

171d. Track and Field Methods.—Two classroom and three field demonstration periods per week.
3 units, winter quarter (WEIERSHAUSER) MWF 10

171e. Methods and Techniques in Minor Sports.
4 units, winter and *spring quarters (HUNT AND STAFF) MTWThF 11

171f. Special Physical Education Methods.—Designed to give students apprenticeship teaching experiences prior to regular student teaching. Open to physical education majors of junior, senior, and graduate standing.
1 to 3 units, all quarters (STAFF)

171g. Athletic Conditioning.—Prevention and care of injuries. Principles, techniques, and practices of athletic training. Special instruction is given in the techniques of taping and the use of special methods and devices to prevent and care for injuries.
2 units, autumn quarter (WEIERSHAUSER) TTh 1

171h. Methods in Corrective and Restricted Physical Education.—Methods, techniques, and programs of physical education for individuals who are unable to participate in the general program.
2 units, winter quarter (STAFF) TTh 10

171i. Golf Methods.—Preference will be given to physical education major and minor students. Other students above first-year Lower Division status may enroll with the permission of the instructor.
3 units, winter quarter (FINGER) MWF 11

172. Program of Physical Education.—An analysis of physical education activities and the physical education curriculum.
3 units, spring quarter (HUNT) MWF 10

173. Athletic Officiating Methods Courses for Men.—Each course is planned and conducted by the director of the sport involved, with the assistance of his staff. Admission only by permission of the instructor. Not open to first-year Lower Division students.

173a. Football Officiating Methods.
1 unit, autumn quarter (TAYLOR) Th 8

173b. Basketball Officiating Methods.
1 unit, winter quarter (———) T 8

173c. Baseball and Track and Field Officiating Methods.
1 unit, spring quarter (DEAN, WEIERSHAUSER) T 8

174. Methods in Physical Education Activities.
2 units, autumn quarter (HUNT) TTh 10

175. Administration of Men's Physical Education.
4 units, spring quarter (NIXON) MTWTh 9

256. Physiological Bases of Physical Education.
4 units, autumn quarter (STAFF) MTWTh 8

258. Trends and Practices in Recreation.
3 units, spring quarter (GUTHRIE) MWF 9

263a, b, c. Methods in Officiating.
1 unit each quarter (STAFF) By arrangement

264. Analysis of Body Movement (Advanced).
3 units (RUCH) By arrangement

265. Administration of Women's Physical Education.
4 units, winter and *summer quarters (KNAPP) MWF 1-3

266. Teaching Progressions in Dance (Advanced).
2-3 units (DUGGAR, LIDSTER) By arrangement

267. Teaching Progressions in Individual Sports (Advanced).—Prerequisite: above-average ability in sport selected. Two hours lecture and four hours laboratory per week.
1 to 4 units, spring and *summer quarters (STAFF) By arrangement

268. Teaching Progressions in Team Sports (Advanced).—Prerequisite: above-average ability in sport selected. Two hours lecture and four hours laboratory per week.
1 to 4 units, spring and *summer quarters (STAFF) By arrangement

269. Survey of Current Sports Literature.
2 units, winter and *summer quarters (BARR) By arrangement

270. Research Methods in Physical Education.
3 units, winter quarter (NIXON) MWF 8

356. Recent Literature and Research Studies in Physical Education.—A background course for students planning to do research in physical education. Open to both men and women.
3 units, autumn quarter (NIXON) MWF 11
4 units, *summer quarter (NIXON) MTWThF 8

359. Philosophy of Physical Education.—Prerequisite: Education 156, or equivalent, or consent of the instructor.
3 units, spring quarter (NIXON) Th 7–10 P.M.

365. Administrative Problems in Women's Physical Education.—Open only to students who have had teaching experience.
4 units, winter quarter (KNAPP) By arrangement

365s. Administrative Problems in Physical Education.
2 or 4 units, summer quarter (KNAPP, NIXON) MTWThF 9

370. Special Assignments, Men's Physical Education.
1 to 5 units, any quarter (NIXON) By arrangement

460. Seminar in Physical Education.
3 to 9 units (KNAPP) By arrangement

461i. Individual Study in Women's Physical Education.
2 to 6 units (KNAPP)

470i. Individual Study in Men's Physical Education.—Individual investigations of special subjects, problems of advanced degrees excluded. Open only to specially equipped students.
2 to 6 units, any quarter (NIXON)

NUTRITION

N196. Management in Relation to Family Living.—Activities and interests of women in the home. Course consists of lectures, field trips, and laboratory work. Limited registration: open on application to instructor.
3 units, winter quarter (RICKER AND STAFF) By arrangement

HYGIENE

The Department of Hygiene consists of the Division of Health Education and the Division of Physical Therapy. Faculty members, courses of instruction, credentials, and degrees are listed separately under each of these two divisions.

HEALTH EDUCATION

WALTER H. BROWN, GEORGE SPARR LUCKETT, Professors Emeriti

OLIVER ERASMUS BYRD, Professor
JOHN F. ECKERT, Assistant Professor
MARSTON A. GIRARD, Acting Assistant Professor
ROBERT D. RUSSELL, Instructor

The undergraduate courses in health education are based upon the philosophy that knowledge of the factors that influence health should be the possession of every cultured individual and that an understanding of the principles of healthful living requires training in the application of the scientific facts of the various fundamental sciences which are related to health.

The graduate courses in health education are designed for the training of teachers and school administrators who desire special competence in the field of school health.

TEACHING CREDENTIALS

Students in the Department of Hygiene may follow a major or minor sequence of study in the Division of Health Education leading to teaching credentials for the state of California. For the details of these requirements the student is referred to the credential secretary of the School of Education.

DEGREES

Through the School of Education the Department of Hygiene offers the A.B., A.M., and Ed.D. degrees with specialization in health education. A minimum of 30 units from the curriculum of the Division of Health Education plus 15 units in certain basic sciences is required for the A.B. degree. Candidates for the Master of Arts degree must complete at least 36 units of graduate work in the Division of Health Education. The degree of Doctor of Education may be recommended for those candidates who satisfy the requirements of the School of Education and who devote approximately one-half of their course work on the graduate level to certain offerings from the Division of Health Education of the Department of Hygiene. Complete information on this degree can be secured from the Dean of the School of Education.

UNDERGRADUATE COURSES

H50. Constructive Hygiene.—Open to all students.
3 units, any quarter (STAFF)

H51. Defensive Hygiene.—Open to all students.
3 units, autumn, *winter, and *spring quarters (STAFF)

H75. First Aid.
2 units, autumn, *winter, *spring, and *summer quarters (STAFF) By arrangement

H101. Family Health.—Limited enrollment.
3 units, autumn quarter (STAFF)

H102. Public Health.
3 units, spring quarter (STAFF)

H103. Nutrition.
3 units winter quarter (STAFF)

H104. Infection and Immunity.
3 units, autumn quarter (STAFF)

H105. Chronic Disease.
3 units, autumn quarter (STAFF)

H106. Personal Mental Hygiene.—Practical application of the principles that promote and maintain mental health in the normal person. Consideration is also given to the common deviations from mental health. Limited enrollment.
3 units, spring quarter (STAFF)

H107. Safety.
3 units, autumn quarter (STAFF)

H108. Medical Care Plans.
3 units, winter quarter (STAFF)

GRADUATE COURSES

H200. Source Materials I.—Designed for school health educators. For education majors only.
4 units, autumn and *summer quarters (STAFF)

H201. Source Materials II.—Complementary to Source Materials I, and may be taken either before or after the latter course. For education majors only.
4 units, spring quarter (BYRD)

H214. School Hygiene Programs.—For education majors only.
4 units, winter and *summer quarters (STAFF)

H215. Teaching Units.—For education majors only.
4 to 16 units, spring quarter (BYRD)

H216. School Health Examinations.
3 units, autumn quarter (STAFF)

H217. Advanced Nutrition.
4 units, spring quarter (STAFF)

H218. Endemic and Epidemic Disease.
4 units, winter quarter (STAFF)

H219. Health in Old Age.
3 units, spring quarter (STAFF)

H220. Safety Education.
4 units, winter quarter (STAFF)

H221. Voluntary Health Agencies.
4 units, winter quarter (STAFF)

H300. Seminar in Health Education.—Limited to candidates for the doctor's degree in health education or to school administrators and teachers who have special problems in the field of health education.
4 units, autumn quarter (STAFF)

H302. Community Health Programs.
4 units, spring quarter (STAFF)

H303. Philosophy of Public Health.—Registration is limited to candidates for advanced degrees in health education.
2 units, spring quarter (STAFF)

H304. International Health.
3 units, spring quarter (STAFF)

H400. Individual Study in Health Education.
3 to 15 units, any quarter (STAFF)

PHYSICAL THERAPY

WILLIAM H. NORTHWAY, Professor of Medicine (Physical Medicine)
LUCILLE DANIELS, Associate Professor and Director
HERBERT BROWNE, HELEN HARDENBERGH, Associate Clinical Professors
MARIAN WILLIAMS, Assistant Professor
MAURICE GROSSMAN, RAOUL C. PSAKI, Assistant Clinical Professors
CATHARINE GRAHAM, GEORGIANNA HARMON, SARAH SEMANS, Instructors
OLENA M. COLE, MICHAEL KEROPIAN, MAXINE SCHULDT, Clinical Instructors

In the field of physical therapy, the following program is offered in conjunction with the Division of Physical Therapy of the Stanford University Hospitals: (I) a four-year course leading to the Bachelor of Arts degree; (II) a four-quarter, twelve-month course for students with a Bachelor's degree and adequate training in the basic sciences; (III) the Master's degree; (IV) a minor field for the Doctor of Education; and (V) the Doctor of Philosophy minor. Program (I), plus an additional quarter of clinical training, and Program (II) prepare for the examination of the American Registry of Physical Therapists and conform to the standards of the Council on Medical Education and Hospitals of the American Medical Association.

I. PROGRAM FOR THE DEGREE OF BACHELOR OF ARTS

**Lower Division:*

Courses in biological science equivalent to one course each quarter for three quarters are required. General biology, botany, zoology, bacteriology, comparative vertebrate anatomy or embryology, and general or plant physiology may be used to fulfill this requirement (all courses must include laboratory work).

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* See *Information Bulletin* for general University Lower Division requirements.

Courses in physical science equivalent to one course each quarter for three quarters are required; of these, at least one should be taken in chemistry. Courses in physics or mathematics or both may be used to fulfill the additional two-quarter requirement (chemistry and physics courses must include labortory work).

General Psychology and Introduction to Physical Therapy should be taken during the first two years.

Students should confer with a physical therapy adviser as early as possible to determine the best course sequence.

Upper Division:

Physiology 101. Principles of Human Physiology.
Physiology 113. Physiology of Adaptation.
Anatomy 114. Practical Anatomy.
Physical Therapy 150 to 195, and at least one Upper Division course in psychology are required. Education 155, Elementary Analysis of Body Movement, and Education 169, Kinesiology, courses in health education, and additional courses in psychology should be included in this program.

II. PROGRAM FOR THE TWELVE-MONTH COURSE

Students applying for this course should present a Bachelor's degree. They should have completed the biological science, physical science and psychology courses listed under Lower Division in the preceding program and additional courses in physiology, anatomy, and social science including psychology.

Courses in this program include Physiology 101, Anatomy 114 and Physical Therapy 150–200.

III. PROGRAM FOR THE DEGREE OF MASTER OF ARTS

Candidates should present a Bachelor's degree in physical therapy, *or* a Bachelor's degree and a credential of completion for a course in physical therapy approved by the Council on Medical Education and Hospitals of the American Medical Association.

Experience in the field is a prerequisite and the program will be planned with each individual on the basis of former training and present interest. A thesis satisfactory to the faculty adviser and the University Committee on Graduate Study is required. Candidates must complete a minimum of forty-five units of credit (including units for thesis).

IV. PROGRAM FOR MINOR FIELD FOR ED.D., OR PH.D. MINOR

A qualified physical therapist may select, with the approval of the adviser, units from the courses numbered above 200.

SCHOLARSHIPS, FELLOWSHIPS, AND LOAN FUNDS

Scholarships for students who have completed prerequisite courses are available through the California Elks Association, the Elks National Foundation and the United Cerebral Palsy Association of the Peninsular Cities. The National Foundation for Infantile Paralysis offers such scholarships and also teaching fellowships for students who are working toward an advanced degree and are interested in teaching. The Kellogg Foundation maintains a loan fund for Upper Division and graduate students.

COMMISSIONS IN THE ARMED SERVICES

The U.S. Air Force and the U.S. Navy offer commissions to senior women in the Bachelor's degree program and to graduate women who are accepted for admission to the twelve-month course. Students pay tuition and maintenance from their officers' salaries.

BASIC PROGRAM

100. Introduction to Physical Therapy.—A general survey of the current procedures used in physical therapy and a brief review of the historical background of the field. Open to Lower Division students.
2 units, autumn and *winter quarters (DANIELS) TTh 12-1

150. Elements of Pathology.
2 units, autumn quarter (HARDENBERGH) By arrangement

161. Ethics and Clinic Procedures.—A study of ethics and the physical therapist's relationships with other professional personnel in the medical field. General clinical procedures are analyzed and methods of charting and recording presented.
3 units, autumn and *summer quarters (DANIELS, GRAHAM) By arrangement

164. Massage.—The study of the theory of massage from an anatomical and physiological viewpoint, combined with the analysis and practice of the technique.
1 or 2 units, autumn and *summer quarters (GRAHAM, HARMON) By arrangement

165. Hydrotherapy.—An analysis of the principles underlying hydrotherapy treatment and a presentation of the essential techniques.
1 unit, summer and *winter quarters (HARMON, SEMANS) By arrangement

170. Physical Therapy as Applied to Orthopedics and Surgery.
2 units, autumn quarter (BROWNE) By arrangement

175. Principles of Electrotherapy and Light Therapy.—An analysis of the principles underlying the use of high- and low-frequency currents and ultraviolet and infrared radiation in the treatment of injury and disease.
2 units, autumn quarter (NORTHWAY) By arrangement

176. Electrotherapy and Light Therapy Laboratory.
2 or 3 units, autumn quarter (GRAHAM) By arrangement

180. Advanced Kinesiology.—The study of joint motion and muscular function in relation to both normal and abnormal conditions.
4 units, winter and *summer quarters (SEMANS) By arrangement

188. Therapeutic Exercise.—A presentation of the theory and practice of manual muscle testing and muscle re-education. Posture, body mechanics and functional activities are studied in relation to various pathological conditions.
4 units, autumn and *winter quarters (STAFF) By arrangement

189. Therapeutic Exercise.—A study of the use of exercise in the treatment of poliomyelitis, cerebral palsy and other physical disabilities.
2 or three units, winter and *spring quarters (STAFF) By arrangement

190. Physical Therapy as Applied to Medicine, Neurology, and Pediatrics.
2 units, spring quarter (NORTHWAY) By arrangement

192. Clinical Problems in Physical Therapy.
2 units, winter and *summer quarters (DANIELS, GRAHAM) By arrangement
[Given in San Francisco]

193. Professional Relationships.
1 unit, spring quarter (STAFF) By arrangement
[Given in San Francisco]

194. Psychology of the Handicapped.—A study of the special problems of the handicapped individual with emphasis on total rehabilitation.
2 units, spring quarter (GROSSMAN) By arrangement
[Given in San Francisco]

195. Clinical Training and Practice in Physical Therapy.
2 to 8 units, any quarter (STAFF) By arrangement
[Given in San Francisco]

200. Clinical Practice in Physical Therapy.
2 to 8 units, any quarter (STAFF) By arrangement
[Given in San Francisco]

COURSES PRIMARILY FOR ADVANCED STUDENTS

In the Master's degree program, courses are available in advanced basic science, scientific writing, education and speech correction. A minimum of 20 units must be taken from the following:

220. Survey of Kinesiology.—A study of normal and pathological muscle function. Consideration will be given to the functional anatomy of different areas and to analysis of gaits.
3 units, autumn quarter (WILLIAMS) By arrangement

221. Therapeutic Exercise for Specific Conditions.—Presentation and discussion of procedures used in the treatment of conditions that are a widespread problem in the field.
3 units, autumn quarter (STAFF) By arrangement

224. Problems in Kinesiology.—Analysis of material relating to special areas of the field with emphasis on research procedures.
3 units, winter quarter (WILLIAMS) By arrangement

225. Physical Therapy for Infantile Paralysis.—Physical therapy procedures in the acute, convalescent, and chronic stages of infantile paralysis are discussed and practiced.
2 to 4 units, summer quarter (DANIELS) By arrangement

226. Study of a Special Problem in Physical Therapy.
1 to 8 units, any quarter (STAFF) By arrangement

227. Physical Therapy for Cerebral Palsy.—An analysis of the types of cerebral palsy is presented, together with the influence of psychological and environmental factors. Occupational and physical therapy techniques are surveyed and practiced.
2 or 3 units, summer quarter (SEMANS) By arrangement

230. Muscle Testing.—Presentation and discussion of the principles of manual and myodynemetric testing and the practice of techniques.
2 or 3 units, summer quarter (STAFF) By arrangement

244. Clinical Practice in Special Parts of the Field.
1 to 6 units, any quarter (STAFF) By arrangement

245. Clinical Supervision of Students.
2 or 3 units, autumn, *winter, and *spring quarters (GRAHAM) By arrangement

252. Methods of Teaching Therapeutic Exercise.—A study of the organization, content, techniques in teaching, and the objectives of courses in therapeutic exercise.
2 or 3 units, winter quarter (DANIELS) By arrangement

253. Seminar in Administration.—Administrative problems in hospitals, clinics, public health agencies, and schools.
2 or 3 units, spring quarter (DANIELS) By arrangement

280. Seminar on Thesis Problems.
1 to 3 units, autumn quarter (STAFF) By arrangement

290. Master's Thesis in Physical Therapy.
5 to 8 units (STAFF) By arrangement

295. Research.
(STAFF) By arrangement

[NOTE.—Summer quarter courses in Physical Therapy will be ten weeks in length.]

SCHOOL OF ENGINEERING

THEODORE JESSE HOOVER, Dean of the School of Engineering, Emeritus

FREDERICK EMMONS TERMAN, Dean of the School of Engineering
HUGH HILDRETH SKILLING, Associate Dean
LEROY FARRELL MCGHIE, Assistant to the Dean
HARRY A. WILLIAMS, Secretary of the Faculty

The School of Engineering includes the departments of Civil Engineering, Electrical Engineering, and Mechanical Engineering; the divisions of Aeronautical Engineering and Engineering Mechanics; and the Industrial Engineering Program.

The School offers undergraduate curricula permitting specialization in the major fields of engineering leading to the degree of Bachelor of Science, and various graduate curricula, administered by the departments of the School, leading to the degrees of Master of Science, Engineer, and Doctor of Philosophy. Requirements for the degree of Bachelor of Science may normally be completed in twelve quarters. Instruction in engineering is offered in each of the four quarters of the academic year. Students who attend three quarters each year, omitting the summer quarter, will ordinarily graduate at the end of four years.

Summer quarter courses in the School of Engineering normally extend through the full ten-week term, ending about the last of August.

UNDERGRADUATE DIVISION

ADMISSION

Students admitted to the University are permitted to major in the School of Engineering if they elect to do so. There are no additional procedures, course requirements, or examinations for admission to the School.

PREPARATION RECOMMENDED FOR FRESHMEN

Students who enter as freshmen should have taken high school English, and mathematics through trigonometry. High school courses in physics, chemistry, and machine drawing are recommended but are not required. A year of high school biological science (biology, botany, or zoology) will save time by anticipating a Lower Division requirement at Stanford. (See Notes 1a, 1b, and 10, below.)

Deficiencies in high school English or mathematics are remedied by taking the following courses at Stanford:

MAKE-UP COURSES TAKEN ONLY IF REQUIRED

English A	Elementary Composition (Note 1a)
Math. A	Algebra (Note 1b)
Math. C	Trigonometry (Note 1b)

NOTE 1a. English A is required of first-year undergraduates who do not pass the matriculation test in English.

NOTE 1b. Math. A, Algebra, or Math. C, Trigonometry, are required of engineering students who do not pass the placement tests in algebra or trigonometry, respectively. These tests are given by the Mathematics Department, after registration, to students enrolled in mathematics courses.

PREPARATION RECOMMENDED FOR TRANSFER STUDENTS

Students who will do the early part of their college work elsewhere and then transfer to Stanford to complete their engineering programs should follow an engineering or pre-engineering program at the first school, or should select courses applicable to the requirements of the School of Engineering. Otherwise a total of more than four years may be required to obtain the B.S. degree.

Transfer credit will be applied to School of Engineering requirements whenever the courses are equivalent or substantially similar. Transfer credits for courses not required of Stanford engineering students will be substituted for requirements when the overall program is not reduced in value. The policy of the School is to study each transfer student's preparation and make a reasonable evaluation of his status.

The great flexibility which is usable in planning and scheduling individual programs makes it possible for transfer students having wide variations in preparation to plan full programs for each quarter and to progress normally toward graduation.

UNDERGRADUATE ENGINEERING CURRICULA

It is the purpose of the School to arrange a suitable course of study for each student of engineering. This is done by providing a number of curricula, as listed below, and allowing modification (within limits) to fit individual needs.

In four professional fields, Civil, Electrical, Industrial, and Mechanical Engineering, curricula (accredited by the Engineers' Council for Professional Development) are offered. A curriculum in Engineering Science allows emphasis on the basic sciences and mathematics of engineering; this program will lead, in most cases, to graduate study and design or research work, and is available to students of demonstrated competence. A curriculum leading to the B.S. degree in engineering, without specification of a major department, is also available.

Courses common to all curricula appear in the first table below. Optional programs are given in the following tables for (1) Civil Engineering; (2) Electrical Engineering; (3) Mechanical Engineering; (4) Industrial Engineering; (5) Engineering Science; and (6) Engineering without specification of a major field. (For Chemical Engineering see page 134; for Mining, Metallurgical, and Petroleum Engineering, see pages 359–361). A student who satisfactorily completes the courses taken by all students of engineering, together with one of these optional programs of study, will be recommended by the School of Engineering for the degree of Bachelor of Science.

These listed programs are not to be interpreted as rigorous requirements. Substitution of other courses for those indicated, particularly in the optional lists, may be allowed with the approval of the Registration Committee of the School of Engineering, and the Dean. *Every student is urged to discuss with his faculty adviser any substitution that would improve the curriculum for his personal needs.*

COURSES TAKEN BY ALL STUDENTS OF ENGINEERING

Course No.	Subject	Units
Physics 51, 53, 55	Engineering Physics	15
Math. 10, 11, 21, 22, 23	Analytic Geometry and Calculus (Note 2)	15
Chem. 1, 2, 4	General Chemistry	11
English 2*a*, 2*b*	English Composition	6
History 10, 11, 12	History of Western Civilization (Note 3)	12
M.E. 1 or 2	Shop (Notes 4 and 5)	2
M.E. 8	Machine Drawing	4
C.E. 99	Engineering Mechanics	5

— — — — — — — — — —(Note 6) —

C.E. 100n	Engineering Mechanics	5
C.E. 110, 112	Mechanics of Materials	5
C.E. 106	Fluid Mechanics	5
M.E. 132	Thermodynamics	3
M.E. 122	Mechanical Engineering Laboratory	3
M.E. 3	Machine Shop (Note 4)	2
I.E. 130	Engineering Economy	3
E.E. 100	Principles of Electrical Engineering (Note 7)	3
E.E. 102	Introduction to Electrical Machinery	3
M.S. M104	Principles of Physical Metallurgy (Note 5)	3
Econ. 1, 2	Elementary Economics (Notes 3 and 8)	10
English 129 (or 131)	Scientific Writing (or Exposition)	3
Speech 20	Public Speaking	3
	Humanities (Notes 3 and 9)	5
	Biological Science, or Geology and Hygiene (Note 10)	5 to 9
		131 to 135

NOTE 2. Math. 41, 42, anl 43 may be substituted for Math. 10, 11, 21, 22, and 23.

NOTE 3. This note concerns only Upper Division transfer students. Certain courses in history, economics or other social science, and humanities are required ot Stanford students. A transfer student accepted at Stanford with Upper Division standing may substitute for these specific courses 27 quarter-units of credit in the fields of the social sciences, biological sciences, humanities or languages, taken either at Stanford or at the college from which he transfers. However, courses taken at Stanford by an Upper Division transfer student in satisfaction of this requirement need not exceed an average of 3 units per quarter of registration at Stanford.

NOTE 4. Students in Mechanical Engineering and Industrial Engineering take *both* M.E. 1, Forging and Welding, and M.E. 2, Foundry Practice, as well as M.E. 3, Machine Shop Practice.

NOTE 5. Students in Electrical Engineering may, with their adviser's approval, take any courses of at least equal credit in engineering, physical science, or mathematics instead of M.E. 1 or 2, Engineering Shops (2 units), or M.S. M104, Physical Metallurgy (3 units), or both.

NOTE 6. Courses listed above the dashed line are most advantageously completed during the first two years. So, also, are the following:

For students of Civil Engineering	C.E. 20 and Geol. 1a
For students of Electrical Engineering	E.E. 100, 101, 102, and Math. 24
For students of Mechanical Engineering	M.E. 10 and Math. 24

Other technical and laboratory courses may well be taken in the first two years. *It is not necessary (nor is it considered desirable) for engineering students to complete all Lower Division requirements in the first two years.*

NOTE 7. It is particularly important for electrical engineering students to complete E.E. 100, which is prerequisite to E.E. 104, before the autumn quarter of the third year.

NOTE 8. Econ. 1 and 2 may be replaced, with the adviser's approval, by any of the alternatives in Group III(*b*) of the Lower Division requirements as listed in the *Information Bulletin.*

NOTE 9. The five-unit humanities requirement is in lieu of a University requirement in Humanities. It is in addition to other requirements listed. Consult your adviser for suitable courses in literature, art, music, language, psychology, etc.

NOTE 10. The Stanford Lower Division requirement of biological science (Group II, a1A) may be satisfied by taking a year of biology, zoology, or botany in high school; or by taking Biology 1, 2, and 3 at Stanford; or (for engineering students) by taking hygiene (Educ. H50 or 51) and geology (M.S. G1a or 1). The geology course is required of students in Civil Engineering.

If you are taking Civil Engineering:

If you did not have biological science in high school, take Geology and Hygiene (8 units).

If you did have biological science in high school, take Geology (5 units).

Upper Division transfers must have Geology (5 units) or equivalent.

If you are taking an engineering option other than Civil Engineering:

If you did not have biological science in high school, take either Biol. 1, 2, and 3 (9 units) or Geology and Hygiene (8 units).

If you did have biological science in high school, or if you are an Upper Division transfer, elect 5 units.

OPTIONAL PROGRAMS

1. CIVIL ENGINEERING

Course No.	Subject	Units
M.S. G1a (or 1)	Geology	*
C.E. 20	Surveying	3
C.E. 114	Mechanics of Materials	3
C.E. 125	Advanced Surveying	3
C.E. 127	Engineering Surveys	3
C.E. 138	Specifications and Contracts	3
C.E. 150	Transportation Engineering	3
C.E. 160	Hydrology	3
C.E. 161	Hydraulic Structures	3
C.E. 191	Concrete	3
C.E. 193	Timber Design	3
C.E. 194	Steel Design	4
C.E. 196	Concrete Design	3
C.E. 197	Foundations	3
Optional courses as below		15
		55

The program on page 52 is not a rigorous requirement but may be adapted, within limits, to fit reasonable individual needs.

The optional courses normally will be selected from undergraduate offerings in civil engineering or closely allied subjects. With permission, some courses designated as primarily for graduate students may be included. Suggested use of these units by students with well-defined interests in construction, highway, hydraulic, or structural engineering are listed below. Strict adherence to one of these programs is not required. Students whose interests lie primarily in engineering administration may select courses from the curriculum in industrial engineering. Students preparing for graduate study in Engineering Mechanics should include Math. 24, Math. 130 (or M.E. 118), and M.E. 160 as part of their undergraduate programs in civil engineering. Students preparing to take graduate work in Sanitary Engineering at another university should include Biology 1 and 2 (6 units) or Biology 20 (5 units), Bacteriology 101 (5 units), and C.E. 166, Sanitary Engineering (3 units) among their electives.

Suggested Use of Optional Units

Construction: C.E. 154, Construction Estimates and Costs (3 units); C.E. 155, Construction Equipment and Methods (3 units); I.E. 133, Accounting (3 units); Law 101, Business Law (5 units); and Psychology 192, Industrial Relations (4 units).

Highways: C.E. 151, Highway Engineering (3 units); C.E. 155, Construction Equipment and Methods (3 units); C.E. 162, Hydraulic Engineering (3 units); C.E. 166, Sanitary Engineering (3 units); and C.E. 195, Soil Mechanics (4 units).

Hydraulics: C.E. 155, Construction Equipment and Methods (3 units); C.E. 162, Hydraulic Engineering (3 units); C.E. 166, Sanitary Engineering (3 units); C.E. 195, Soil Mechanics (4 units); and Statistics 110, Experimental Statistics (4 units).

Structures: C.E. 192, Elementary Structural Analysis (3 units); C.E. 195, Soil Mechanics (4 units), Math. 24 (3 units); C.E. 162, Hydraulic Engineering (3 units); and C.E. 166, Sanitary Engineering (3 units). Students intending to take graduate work in structural engineering should include Math. 24 as an undergraduate course.

2. ELECTRICAL ENGINEERING

Course No.	Subject	Units
Math. 24	Calculus	3
Phys. 57	Engineering (Atomic) Physics	3
E.E. 103n	Principles of Electrical Engineering	3
E.E. 104, 105, 106	Electrical Engineering Circuits	9
E.E. 116	Circuits: Transients	3
E.E. 117	Circuits: Transmission Lines	3
E.E. 128	Servomechanisms	3
E.E. 150, 151, 152	Electronics	9
	Optional program A, B, or C as below	17 (to 27)†
		53

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* Geology is a 5 unit course; credit is included in the entry "Biological Science, or Geology and Hygiene" in the table on page 53. See Note 10.

† See Notes, page 55.

Suggested Use of Optional Units

Courses to complete the undergraduate program will be selected according to the student's interest. The following three lists of courses are suggested. These are arranged for three general types of interest in electrical engineering, and students who wish variations or intermediate arrangements should see their registration advisers.

List A is for students with a primary interest in the business and administrative aspects of electrical engineering such as plant management, contracting, selling, application engineering. Students who like to deal with people, and prefer committee work to laboratory work, may wish to choose this list.

List B is for students who expect to engage in technical electrical engineering work such as design or operation of apparatus, circuits, or systems. This is the standard preparation for the professional electrical engineer. Graduate study leading to the M.S. or Engineer degree is recommended to follow this program.

List C is for students interested in science and mathematics, preparing for life work in electrical engineering research or teaching. This course should be followed by graduate study, possibly to the Ph.D. degree, in preparation for such positions.

List A:

E.E. 160	Electronic Circuits	3
E.E. 108	Illumination	3
Psych. 51	General Psychology	5
Electives	See notes * and †	6 (to 16)
		17

List B:

Math. 130	Ordinary Differential Equations	3
E.E. 160	Electronic Circuits	3
Electives	See notes * and ‡	11 (to 21)
		17

List C:

Math. 130	Ordinary Differential Equations	3
Mathematics	Any suitable mathematics courses	6
E.E. 160, 161	Electronic Circuits	6
E.E. 170, 171	Electronic Measurements	6
E.E. 270	Elementary Electromagnetic Theory	3
Electives	See notes * and §	6 (to 11)
Substitutions	Omit from the list of "Courses Taken by All Students of Engineering" the following: M.E. 1 and 2, and 122, C.E. 110, 112, and Metallurgy 104	(–13)
		17

Notes: * The smaller number of units shown are available to all. If M.E. 1 and 2, Shops, and Metallurgy 104 are omitted from the program of study (see Note 5, p. 53), the units available for "Electives" in Lists A and B are increased by 5. If neither biological science nor geology and hygiene are taken (see Note 10), an additional 5 units are available in each list.

† Electives in List A: any Electrical Engineering courses (except 108*a*, 143, 145) or any of the courses listed for Industrial Engineering (either the required or substitute list on page 56).

‡ Electives in List B: any Electrical Engineering courses (except 108*a*, 143, 145). E.E. 161, Electronic Circuits, and E.E. 170 and 171, Electronic Measurements; or E.E. 124, 134, etc., Electrical Machinery; or E.E. 108 etc., Illumination, are suggested. E.E. 200, Seminar, is available to fourth-year students.

§ Electives in List C: reasonably advanced courses from the departments of Electrical Engineering, Physics, Mathematics, or Chemistry, with the approval of the registration adviser. *Note*: M.E. 122, C.E. 110, or 112 may be omitted only if the student is taking all the above List C courses with the expectation of pursuing graduate study.

A further substitution suggested for List C, but optional with the student, is Phys. 89 and 91, Mechanics II and Electricity II, and another course in physics (total 9 units) instead of C.E. 99 and 100, Engineering Mechanics (10 units). (For a student following this program, Phys. 89 may replace C.E. 100 as a prerequisite for C.E. 106.)

3. MECHANICAL ENGINEERING

Course No.	Subject	Units
Math. 24	Calculus	3
E.E. 143	Introduction to Electronics	3
M.E. 2 or 1	Foundry Practice or Forging and Welding (Note 4)	2
M.E. 10	Descriptive Geometry	4
M.E. 44	Engineering Computations and Measurements	3
M.E. 114 *a, b*	Machine Design	10
M.E. 118	Differential Equations in Engineering	3
M.E. 123	Heat and Power Laboratory	4
M.E. 133	Engineering Thermodynamics	3
M.E. 160	Dynamics	3
M.E. 161	Dynamics of Machinery	3
C.E. 114	Mechanics of Materials	3
Restricted Electives, as below		5 or more
		49 or more

The student is required to select one or more of the following groups of elective courses according to his major interests.

Mechanical Engineering: M.E. 114*c*, Machine Design (4 units); M.E. 134, Engineering Thermodynamics (3 units); total 7 units.

Aeronautical Engineering: C.E. 192, Stress Analysis (3 units); M.E. 145, Elementary Airplane Structures (2 units); M.E. 146, Introduction to Aerodynamics (2 units); total 7 units.

Engineering Mechanics: M.E. 134, Engineering Thermodynamics (3 units); M.E. 145, Elementary Airplane Structures (2 units); total 5 units.

The program as printed above is not a rigorous requirement but may be adapted, within limits, to fit reasonable individual needs.

4. INDUSTRIAL ENGINEERING

Course No.	Subject	Units
E.E. 143	Introduction to Electronics	3
M.E.1 or 2	Forging and Welding, or Foundry Practice (Note 4)	2
M.E. 103	Advanced Machine Shop Practice	2
M.E. 114*a*	Machine Design	5
I.E. 100	Industrial Organization and Management	3
I.E. 108	Time and Motion Study	4
I.E. 110	Production Control	4
I.E. 120	Quality Control by Statistical Methods	4
I.E. 133*a*	Accounting in Engineering	5
I.E. 147	Production Engineering	4
Stat. 110	Statistical Methods in Engineering and Physical Sciences	4
Law 101	Business Law	5
Psych. 192	Industrial Relations	4
	Statistics or Mathematics Elective	3
		52

Industrial Engineering students may, with the adviser's approval, substitute as many as 15 units of Upper Division or graduate engineering courses, or courses listed below, for an equal number of units from the Industrial Engineering option list.

M.E. 44, Engineering Computations (2); Econ. 145, Labor Problems (5); Econ. 152, Public Utilities (5); Law 102, Business Law (5); Math. 24, Calculus (3); Math. 123, Theory of Probability (3); Psych. 51, General Psychology (5); Psych. 113, Industrial Psychology (3); Stat. 120, Statistical Inference (3); Stat. 214, Experimental Statistics (3); Stat. 216, Sampling Inspection (3).

5. ENGINEERING SCIENCE

Course No.	Subject	Units
Math. 24	Calculus	3
Math. 130	Advanced Calculus	3
Math. 131	Advanced Calculus	3
Phys. 57	Atomic Physics	3
Electives		42
		54

To be eligible for admission to this program the student must have a good record, including not less than a B average in both mathematics and physics. Each student schedule of electives must be approved by the Registration Committee of the School of Engineering, and the Dean, at the time of his admission to the program. In general the electives will be courses in basic science or their engineering applications particularly suitable for preparation for graduate study in the student's chosen field of engineering.

6. ENGINEERING WITHOUT SPECIFICATION OF A MAJOR FIELD

The Bachelor of Science degree in engineering is intended to prepare students for some definite objective involving engineering. It is for those who desire an engineering education as preparation for a business career, who are going into the commercial aspects of engineering, who are in a reserve officer training program, etc. There are also students who desire a background involving unusual combinations in engineering that do not fit into the existing accredited curricula.

Students who wish to obtain a Bachelor of Science degree in engineering without specification of a major field will submit a petition to the Dean's office, outlining their program and plans. Such petitions will be examined by the Registration and Graduation Committee of the School of Engineering and approved only if they provide for a coherent plan and are adequate in quantity and quality of work. These petitions will be on special forms obtainable in the Dean's office, and should be filed not later than the end of the third quarter preceding graduation. Petitions received later than this will be acted upon favorably only if there is special justification for doing so. All petitions must be approved by a registration adviser before they will be considered by the Committee.

The requirements for the Bachelor of Science degree in engineering are as follows:

a) "Courses taken by all students of engineering," as listed on page 52.
b) An additional 57 units, constituting a coherent program; at least 20 of these units must be School of Engineering courses.

Students considering a Bachelor of Science degree in engineering should recognize that this degree is not accredited by the Engineers' Council for Professional Development and, therefore, does not have full standing in connection with registration of engineers in the state of California. Also, students graduating with this degree who later wish to carry on graduate work at Stanford or elsewhere may require more than three quarters to complete the program for the Master of Science degree in a particular field of engineering.

ROTC.—Reserve Officers' Training Corps are maintained at Stanford by the Army, the Navy, and the Air Force (see Air, Military, and Naval Science and Tactics in this *Bulletin.* Students following an engineering program of study who are also enrolled in an ROTC program will usually require more than the normal four years (twelve quarters) in the University to obtain a baccalaureate degree.

These Air, Military, and Naval Science courses require 36 units of credit in addition to the engineering course requirements, and the additional time required will vary from one to three quarters depending upon the circumstances in each case.

Comprehensive Five-Year Programs.—For students who desire a broader training than any included in one of the regular four-year programs of the School of Engineering, Stanford offers Comprehensive Five-Year Programs leading to the degree of Bachelor of Science in engineering.

Dual Degree Program.—Stanford University co-operates with certain liberal arts colleges (presently Knox College, the College of Idaho, the University of Redlands, Willamette University, and Claremont Men's College) in providing a program that leads to concurrent award of the A.B. degree by the college and the B.S. degree by Stanford. The program comprises three years of study at the college, with some emphasis on mathematics and science, followed by two years of study of engineering at Stanford. Inquiries may be addressed to the Dean of Engineering at Stanford, or to the above listed colleges.

GRADUATE DIVISION

ADMISSION

Admission of graduate students to the School is obtained by applying to the Director of Admissions in the manner described in the *Information Bulletin.* Applications are reviewed by the appropriate department of the School before admission is authorized. Inquiries may be addressed to the Dean or the department Executive Head.

Registration

New graduate students should consult the faculty member who acts as adviser in the student's field (or the department secretary) on registration day of his first quarter for advice in planning his program and for instructions on departmental records and procedures.

Graduate Engineering Curricula

Departments and divisions of the School offer graduate curricula, as follows:

Aeronautical Engineering

Aeronautical Engineering

Engineering Mechanics

Engineering Mechanics

Engineering Science

Engineering Science

Industrial Engineering

Engineering Statistics
Engineering Economy

Mechanical Engineering

Thermodynamics, Heat Transfer,
Fluid Mechanics and Design

Civil Engineering

Civil Engineering Administration
Hydraulic Engineering
Structural Engineering

Electrical Engineering

Electronic Engineering and
Electronic Science curricula in:
- Radio communication
- Electron tubes
- Microwaves
- Network theory
- Radio propagation

Power Transmission and High Voltage
Illumination Engineering
Electrical Engineering Administration

The typical graduate curriculum in any field listed above may be had upon application to the department concerned.

Independent Study: Electives.—With the approval of the instructors concerned the graduate may elect to pursue some subjects of his chosen curriculum by independent study or research instead of by joining regular classes. After consultation with the professor concerned with the special field of the curriculum, the graduate is free to plan his curriculum within certain limits set forth in the typical curriculum mentioned above.

Degree of Master of Science

The degree of Master of Science (M.S.) is conferred upon graduate students in engineering, on recommendation to the Academic Council by the Committee on Graduate Study, upon the completion of one academic year of graduate work in the University with a high scholastic standing. The presentation of a thesis is not required.

A Bachelor's degree from this University or evidence of equivalent training is required for admission to candidacy. In no case will the degree be granted unless the student has been registered at Stanford University for three quarters after completing the requirement for the Bachelor's degree. A longer period of residence will be necessary for students who lack preparation prerequisite for essential courses in the graduate curriculum.

Engineering Science.—The degree of Master of Science is available to those who wish to follow a program of study emphasizing the scientific background of some aspect of engineering, and which does not conform to a normal graduate program in a department. Such programs normally combine work in several engineering departments, or contain an unusual amount of mathematics, physics, chemistry, statistics, etc. Application for candidacy for the Master of Science degree in engineering science should be made to the Dean. Only students with superior records will be accepted for this type of program.

Application.—The regulations governing the student's application and admission to candidacy are similar to those for the degree of Engineer (below).

DEGREE OF ENGINEER

The degree of Engineer is awarded at the completion of a comprehensive two-year program of graduate study. It is intended to serve primarily those who desire more training at graduate level than is represented by the M.S. degree, and who are planning to follow a career that emphasizes engineering practice rather than teaching and fundamental research. Men in these latter two categories would normally work for the degree of Doctor of Philosophy and possibly but not necessarily, obtain the degree of Engineer as an intermediate step.

General Regulations.—The degree of Engineer is conferred on recommendation by the Committee on Graduate Study, upon the satisfactory completion of six quarters of approved graduate work (of which a minimum of three quarters must be in residence at Stanford), and the presentation of an acceptable thesis. A longer period of residence will be necessary for candidates who are inadequately prepared or who devote less than the normal proportion of time to their studies.

Program of Study.—The program of study must satisfy the student's department and include ninety units of which at least sixty units must be devoted to advanced or graduate study in the major subject or intimately allied subjects.

Thesis.—Three copies of the thesis, bearing the approval of the instructor under whose supervision it was prepared, must be submitted to the University Committee on Graduate Study by the date on which instruction closes for the quarter in which the degree is to be conferred. These copies shall be the original and first two carbon copies, typed on paper of standard size and weight, with a title page of the form prescribed by the University Committee on Graduate Study, and suitably bound. Upon acceptance, two copies will be placed in the University Library and the third copy will be sent to the major department.

Admission to Candidacy.—Admission to candidacy for the degree of Engineer is granted by the University Committee on Graduate Study to the holder of a Bachelor's degree from this University, or its equivalent, on the basis of an application (1) made in triplicate on the blank provided by the Registrar's office, (2) setting forth the program of study and the subject of the thesis, (3) formally approved by the student's major department, and (4) filed with the Registrar not later than the fourth week of the quarter preceding the final quarter. To allow time for consideration by the department and school, the application should be submitted to the department office at least one week before the above date for filing with the Registrar. The department will approve the application upon satisfactory evidence that the student is adequately prepared to complete the accepted program of study in a creditable manner within the scheduled time, and if the department is able to provide the necessary supervision and instruction. The department will transmit each approved application for admission to candidacy for the degree of Engineer to the University Committee on Graduate Study.

Recommendation.—Upon the satisfactory completion of the foregoing requirements and the receipt of the written recommendation of the school or department, the University Committee on Graduate Study will recommend that the University confer upon the candidate the degree of Engineer.

DEGREE OF DOCTOR OF PHILOSOPHY

Programs leading to the degree of Doctor of Philosophy are offered in each of the departments and divisions of the School. Refer to the *Information Bulletin* for the University regulations pertaining to the degree. Further information is to be found in the department sections following.

DIVISION OF AERONAUTICAL ENGINEERING

LYDIK S. JACOBSEN (Chairman), WILHELM FLÜGGE, JAMES NORMAN GOODIER, ALFRED SALEM NILES, ELLIOTT GRAY REID, *Executive Committee*

The work offered by this division is intended to prepare the student for a professional career in aeronautical design, research, or teaching and may lead to the degree of Master of Science, Engineer, or Doctor of Philosophy in aeronautical engineering. The requirements for all three degrees include training in the fields of aerodynamics, aircraft structures, and aircraft power plants. Candidates for the M.S. degree may elect to emphasize one of these fields, but specialized training in any one requires the broader base provided by the curricula for the Engineer's and Doctor's degrees.

Admission and Registration.—To be eligible for registration in the division a student must have received the Bachelor's degree in engineering, or an acceptable equivalent, and will be expected to have had either the undergraduate courses M.E. 118, 145, 146, and 161, or their substantial equivalents. Registration will be carried out in accordance with the general rules outlined on page 57 of this announcement.

Curricula.—The requirements for the degree of Master of Science are:

a) Either (1) A.E. 234*a*,*b*, 240*a*,*b*,*c*, 241*a*, and 243 (17 units), or
(2) E.M. 200, A.E. 234*a*, 240*a*, and 241*a*,*b*,*c* (16 units).
b) Sufficient approved electives* to make the sum of (a) and (b) equal to 37 units.
c) Eight units of free electives. (Total 45 units.)

Candidates for the degree of Master of Science will be expected to have a minimum scholastic average of 2.75 in engineering courses to secure the division's recommendation for the degree.

The requirements for the degree of Engineer are:

a) E.M. 200, A.E. 234*a*,*b*, 240*a*,*b*,*c*, 241*a*,*b*,*c*, 243, 248*a*, and 249*a* (34 units).
b) Either (1) E.M. 242, A.E. 245, 248*b*, 251*a*, and 252*a* (15 units), or
(2) E.M. 206*a*, 211, A.E. 246*a*,*b*, and 249*b* (13 units).
c) An acceptable thesis (maximum 15 units).
d) Sufficient approved electives* to make the sum of (a), (b), (c), and (d) equal to 75 units.
e) Fifteen units of free electives. (Total 90 units.)

All candidates for the advanced degrees of Engineer and Doctor of Philosophy in aeronautical engineering will be expected to have a minimum scholastic average of 3.00 for work in engineering courses beyond those required for the Master's degree.

General University requirements for the degree of Doctor of Philosophy are set forth in the *Information Bulletin*; to obtain divisional recommendation for this degree, candidates will be expected to satisfy also requirements (a) and (b) listed for the Engineer's degree with the exception of A.E. 248*b*, and 249*b*.

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* Advanced courses in related fields of physics, mathematics, mechanics, or engineering.

Facilities for Instruction and Research.—The Daniel Guggenheim Aeronautic Laboratory houses classrooms, drawing room, library, aerodynamic laboratory, and faculty offices. The library contains a large collection of text and reference books, reports of the principal aeronautical research organizations and files of scientific journals and technical periodicals. In the aerodynamic laboratory are a 7.5 ft. wind tunnel (equipped with six-component balance, propeller dynamometer, special equipment for recording and reducing pressure distribution data, etc.), a portable 1 ft. tunnel used for purposes of demonstration and calibration, and a small but well-equipped shop.

Facilities for statical and dynamical structural research are used jointly with the Division of Engineering Mechanics and the Department of Civil Engineering.

The Mechanical Engineering Laboratory contains equipment for research on power plants and gas dynamics as well as exhibits of typical reciprocating turbojet and rocket types of aircraft power plants.

In addition to these University facilities, members of the Stanford Student Branch of the Institute of the Aeronautical Sciences are frequently privileged to inspect the Ames Aeronautical Laboratory (NACA) and certain Navy equipment at nearby Moffett Field, and the maintenance and operational facilities of the several domestic and transoceanic airlines which utilize San Francisco's Municipal Airport (fifteen miles distant).

COURSES OF INSTRUCTION

[These courses were listed formerly under the Department of Mechanical Engineering.]

234a. Jet Propulsion Systems: Turbojets.—Thermodynamics, fuels, combustion, performance, and operation of pulse jets, ram jets, and turbojets. Fundamentals of compressor, combustion chamber, and gas turbine design. High temperature materials. Two lectures per week. Prerequisite: M.E. 133.
2 units, autumn quarter [Not given in 1954–55]

234b. Jet Propulsion Systems: Turbo-Propeller Engines.—A continuation of 234*a* to include turbo-propeller and ducted propeller engines. Fundamentals of regenerator and reduction gear design. Two lectures per week. Prerequisite: A.E. 234*a*.
2 units, winter quarter [Not given in 1954–55]

235a. Jet Propulsion Systems: Turbojet Design.—The layout and general design of a turbojet including cycle analysis and design of the main components. Two three-hour design periods per week. Prerequisite: A.E. 234*a*, but may be taken in conjunction with A.E. 234*a*.
2 units, autumn quarter [Not given in 1954–55]

235b. Jet Propulsion Systems: Turbo-Propeller Engine Design.—The layout and general design of a turbo-propeller or ducted-propeller engine including regenerator and reduction gear design. Two three-hour design periods per week. Prerequisites: A.E. 234*a* and 234*b*, but may be taken in conjunction with A.E. 234*b*.
2 units, winter quarter [Not given in 1954–55]

240a. Wing Theory.—Fundamental concepts: description of fluid motions, potential and stream functions, momentum theorem, circulation, rotation, vortex motion, sources and sinks; the Kutta-Joukowski theorem; basic principles of induction; lift and drag of monoplane and multiplane; applications of wing theory to wind tunnel boundary effects, ground effect, downwash, etc.; elementary profile theory; span-load distribution. Prerequisites: C.E. 100*n* and 106, M.E. 146.
3 units, autumn quarter (Reid) MWF 8

240b. Aerodynamics of the Airplane.—Viscosity, the boundary layer and skin friction; boundary layer control and effects on drag and separation; control and lift augmenting devices; (subsonic) compressibility effects: wing pitching moments; mutual interference; aerodynamic characteristics of the complete airplane; static and elementary dynamic stability; controllability. Prerequisite: A.E. 240*a*.
3 units, winter quarter (REID) MWF 9

240c. Airplane Performance.—Development of generalized drag and power equations; rigorous methods of predicting performance for propeller-driven and turbojet airplanes; special problems of range, endurance take-off and landing; estimation of performance characteristics by use of formulae and charts. Prerequisites: A.E. 240*b* and 243.
3 units, spring quarter (REID) MWF 9

241a. Airplane Structural Theory.—Review of beam and truss analysis methods, continuous beam analysis by three-moment equation and by moment distribution, bending of thin-walled circular shells, torsion of thin-walled tubes and noncircular sections, circle of stress, combined loadings and interaction curves. Prerequisites: C.E. 114 and 192 (and if possible M.E. 145).
2 units, autumn quarter (NILES) TTh 10

241b. Airplane Structural Theory.—Stable section and thin-walled columns, compression panels, shear deflection, deflections by elastic loads, application of moment distribution to rigid frames and trusses, beam-columns, incomplete tension-field beams. Prerequisites: E.M. 200 and A.E. 241*a*.
3 units, winter quarter (NILES) MWF 8

241c. Airplane Structural Theory.—Analysis of wing and fuselage shell structures, shear lag, torsion bending, curved beams and rings, elementary elastic instability, torsional column failure. Prerequisite: A.E. 241*b*.
3 units, spring quarter (NILES) MWF 8

243. Aircraft Propellers.—Principal theories of propeller action; aerodynamic characteristics of fixed-pitch propellers as affected by pitch, form, and number of blades, body interference and tip speed; controllable pitch, constant speed and dual rotation propellers; methods of selection. Lectures and problems. Prerequisite: A.E. 240*a*.
2 units, winter quarter (REID) TTh 9

245. Aerodynamic Laboratory.—Demonstrations and experiments to familiarize students with the operating characteristics of a wind tunnel; with the use of associated equipment for measuring pressures, velocities, and forces; with the aerodynamic properties of wings and bodies of simple geometric form; and with the principal characteristics of the boundary layer. Prerequisites: A.E. 240*b* and 243.
3 units, spring quarter (REID) By arrangement

246a. Advanced Aircraft Structures.—Problems of aircraft stress analysis requiring advanced standing: Sandwich plates. Pressure cabins. Testing of aircraft structures and their elements. Prerequisites: A.E. 241*c* or E.M. 202, 206.
2 units, winter quarter (FLÜGGE) TTh 11

246b. Aircraft Structural Dynamics.—Impact on landing gears. Aeroelastic problems. Flutter. Prerequisite: A.E. 241*c* or E.M. 202.
2 units, spring quarter (FLÜGGE) TTh 10

247. Aeronautic Problems.—Investigation, experimental or otherwise, of problems in aeronautics. The intent of this course is to offer an opportunity to students to do work in any field of aeronautics of special interest.
2 to 5 units, any quarter (STAFF) By arrangement

248a,b. Aerodynamic Design.—The layout and general design of an airplane for a specific duty, including analysis and prediction of stability, controllability, and performance. Prerequisites: A.E. 240*a–c*.

248a. 5 units, autumn quarter (REID) By arrangement
248b. 2 units, winter quarter (REID) By arrangement

249a,b. Airplane Structural Design.—Study of Civil Aeronautics Authority structural design requirements, preparation of partial stress analysis and detail design of airplane developed in A.E. 248, and study of recent literature, with application of various proposed methods of stress analysis to that design. Prerequisites: M.E. 145, A.E. 241*a,b,c*, and 248*a*.

249a. 3 units, winter quarter (NILES) By arrangement
249b. 3 units, spring quarter (NILES) By arrangement

251b. Compressible-Flow Theory.—Prandtl-Meyer expansion; airfoils in two-dimensional supersonic flow; differential equations of fluid motion in three dimensions; nature of solutions in subsonic and supersonic flow. Prerequisite: M.E. 238*a*.

2 units, winter quarter [Not given in 1954–55]

251c. Compressible-Flow Theory.—Conical supersonic flow; theory and method of characteristics; three-dimensional wing theory; applications to high-altitude high-speed aircraft. Prerequisite: A.E. 251*b*.

2 units, spring quarter (———) [Not given in 1954–55]

252a. Aerodynamics of High-Speed Flight.—Fundamental relations of compressible flow and reduction to linearized form; unidimensional flow; basic potential equations; special methods of solving potential equations; calculation of wing force characteristics; two-dimensional thin-airfoil theory for supersonic and subsonic flow; simple theory of swept wings. Prerequisite: M.E. 146.

2 units, autumn quarter (HEASLET) TTh 8

252b. Aerodynamics of High-Speed Flight.—Three-dimensional subsonic wing theory; pressure distributions, forces and moments, systems having minimum drag. Reciprocal theorems; applications to wings, tails, and wing-body combinations. Subsonic and supersonic flow about slender wings, bodies, etc., including determination of optimum configurations. Transonic flow; resumé of theoretical and experimental results. Prerequisite: A.E. 252*a*.

2 units, winter quarter (SPREITER) TTh 8

252c. Aerodynamics of High-Speed Flight.—Linearized wing theory in three-dimensions, with special emphasis on wings in supersonic flight. Two- and three-dimensional wings in unsteady flight at both subsonic and supersonic speeds with application to dynamic response and wing flutter. Prerequisite: A.E. 252*a*.

2 units, spring quarter (LOMAX) TTh 8

253. Reading in Compressible-Flow Theory.

1 unit, autumn, winter, and spring quarters (———) By arrangement

260a. Principles of Helicopter Design.—Background of helicopter development; aerodynamics of hovering and autorotative flight; blade motion and aeroelastic effects; characteristics of forward flight. Prerequisite: M.E. 146.

2 units, winter quarter (BENNETT) TTh 11

260b. Principles of Helicopter Design.—Discussion of stability and control, helicopter power and rotor systems, and airworthiness and operational requirements. Prerequisite: A.E. 260*a*.

2 units, spring quarter (STUART) TTh 9

300. Thesis.—Investigation of some engineering problems. Required of candidates for the degree of Engineer.

2 to 15 units, any quarter (STAFF) By arrangement

301. Thesis.—Dissertation for the degree of Doctor of Philosophy.

Autumn, winter, and spring quarters (STAFF) By arrangement

CIVIL ENGINEERING

JOHN CHARLES LOUNSBURY FISH, CHARLES MOSER, LEON BENEDICT REYNOLDS, STEPHEN P. TIMOSHENKO, JAMES BERTRAND WELLS, Professors Emeriti
EUGENE VALENTINE WARD, Lecturer Emeritus

EUGENE LODEWICK GRANT, Professor of Economics of Engineering
JOHN KING VENNARD, Professor of Fluid Mechanics
CLARKSON HILL OGLESBY, HARRY A. WILLIAMS, Professors
WILHELM FLÜGGE, DONOVAN HAROLD YOUNG, Professors of Engineering Mechanics
ALFRED SALEM NILES, Professor of Aeronautic Engineering
JACK R. BENJAMIN, RAY K. LINSLEY, Associate Professors
JOSEPH BERNARD FRANZINI, CEDRIC W. RICHARDS, Assistant Professors
NATHANIEL J. KENDALL, RICHARD R. KENNEDY, ROBERT R. MATHEU, Lecturers

Undergraduate Civil Engineering Program.—Civil engineering is a field that includes a number of different branches. The undergraduate civil engineering program given on page 52 stresses civil engineering fundamentals common to all branches. A number of optional units permit flexibility for the student with well-defined interests in a particular branch such as construction, highway, hydraulic, sanitary, or structural engineering.

Graduate Work.—The Civil Engineering Department, in collaboration with other departments of the University, offers specialized graduate work with particular strength in the fields of:

- Structural Engineering
- Hydraulic Engineering:
  - Hydrology
  - Mechanics of Fluids
- Engineering and Construction Administration

Requirements for the Degree of Master of Science.—Programs are available leading to the degree of M.S. in civil engineering with special designation as follows: Civil Engineering Administration; Hydraulic Engineering; Structural Engineering. A general M.S. in civil engineering without special designation is also given. Detailed statements of the general requirements for all Master's degrees and the specific course requirements for a degree with special designation may be secured by request to the Civil Engineering Department.

Students having undergraduate degrees in civil engineering normally can satisfy requirements for the M.S. degree with three quarters of graduate work of satisfactory quality. Students with undergraduate degrees in other fields may need longer residence for the M.S. degree as they will be required to make up any deficiencies in basic undergraduate civil engineering subjects.

Requirements for the Degree of Engineer.—As explained on page 59, a minimum of six quarters of graduate work including a thesis is required for this degree. The student normally should start his thesis early in the fourth quarter of graduate work. Programs leading to the Engineer's degree are given in the three fields of specialization mentioned above.

Requirements for the Ph.D. Degree.—The degree of Doctor of Philosophy is offered under the general regulations of the University (see *Information Bulletin*). This program requires a minimum of three years (nine quarters) of graduate study at least one year of which must be at Stanford. The first year is represented by the M.S. program described above. The second year will be devoted partly to additional courses of graduate study and partly to the preliminary work toward a dissertation. The third year will be applied almost entirely to the completion of an acceptable dissertation.

The program of study will be arranged by the candidate with the advice of a Faculty Committee of three appointed by the department head and having as chairman that faculty member who will direct the thesis work. The final program must be approved by the department. Those fields in which the department will accept candidates for the Ph.D. degree include Structural Engineering and Hydraulic Engineering.

Laboratories.—Departmental facilities for instruction and research include the following:

Concrete laboratory
Fluid mechanics laboratory
Laboratory for experimental
    stress analysis
Materials testing laboratory
Soil mechanics laboratory
Surveying laboratory
Weather station

Assistantships and Scholarships.—A number of part-time teaching and research assistantships with stipends of $1,350 a year or more are awarded each year. Application forms and detailed information may be obtained by writing the Department of Civil Engineering, Stanford University, Stanford, California. Applications normally should be made by March 31 preceding the start of the academic year for which the award is to be made. Appointments as correctors and additional appointments as laboratory and research assistants are made throughout the year on a quarter-by-quarter basis.

The University *Information Bulletin* should be consulted for a description of available scholarships and fellowships and for a description of the procedure for making application. Scholarships limited to civil engineering students include the Charles B. Wing Scholarship, the William Garland Memorial Scholarship, and the Edward F. Jones Memorial Scholarship.

UNDERGRADUATE COURSES

20. Elementary Surveying.—Field: exercises in the care and use of instruments; traverse surveys; stadia surveys; leveling. Drafting Room: plotting and adjusting traverses; computing areas; plotting profile; map drafting. Prerequisites: Mathematics C, and M.E. 8 or ability in lettering satisfactory to instructor. (Limited to 36 students per section.)

3 units, autumn and *spring quarters (———) WF 1–5

99. Engineering Mechanics (Statics).—A course covering the fundamental principles of statics and the application of these principles to structural and mechanical problems. Prerequisite: Mathematics 22. Three lectures and two problem sessions per week.

5 units, autumn quarter (Flügge and staff) MWF 9, Problems TTh 8, 9, or 11
5 units, *winter quarter (Richards and staff) MWF 12, Problems TTh 12
5 units, *spring quarter (Young and staff) MWF 9, Problems TTh 9, 10, or 11
5 units, *summer quarter (———) MWF 11, Problems TTh 11

100n. Engineering Mechanics (Dynamics).—A course dealing with the fundamental principles of dynamics and the application of these principles to typical mechanical problems. Restricted mainly to dynamics of rigid bodies. Prerequisites: C.E. 99 and Mathematics 23. Three lectures and two problem sessions per week.

5 units, autumn quarter (Klotter and staff) MWF 9, Problems TTh 8, 9, or 10
5 units, *winter quarter (Young and staff) MWF 9, Problems TTh 9, or 11
5 units, *spring quarter (Richards and staff) MWF 12, Problems TTh 12
5 units, *summer quarter (———) MWF 11, Problems TTh 11

106. Mechanics of Fluids.—The statics and dynamics of incompressible fluids. Viscosity, fluid friction, laminar and turbulent flow. Flow in pipes and open channels. Measuring devices. Laboratory exercises. Prerequisite: C.E. 100*n*.

5 units, autumn quarter (Vennard) MTThF 12; T or W 1–4

5 units, *winter and *spring quarters (Vennard) MTThF 9; T or W 1–4

5 units, summer quarter (———) MTThF 11; M 1–4

110. Mechanics of Materials.—Strength and elastic properties of the ordinary materials of engineering construction. Simple tension, compression, and shear; flexure, deflection of simple beams, torsion; columns. Prerequisite: C.E. 99.

4 units, autumn, *winter, and *spring quarters (———) MTThF 10

4 units, summer quarter (———) MTThF 9

112. Mechanics of Materials Laboratory.—A laboratory course in which the student makes experiments to verify the theoretical principles learned in Course 110 and studies the properties of a number of materials experimentally. It must be taken concurrently with Course 110.

1 unit, autumn, *winter, and *spring quarters (Richards) W 10 and W or Th 1–3 or 3–5

1 unit, summer quarter (———) W 1–4

114. Mechanics of Materials.—A continuation of Course 110 covering subjects such as: combined stresses, combined bending and twist in circular shafts, beams of two materials, statically indeterminate beams, impact, mechanical properties of materials, and special problems. Prerequisites: C.E. 110 and 112.

3 units, autumn quarter (———) MWF 8

3 units, *spring quarter (Williams) MWF 11

125. Advanced Surveying.—Adjustment of instruments, engineering astronomy, land surveying, introduction to city surveying, base line measurement, triangulation, plane table. Prerequisite: C.E. 20.

3 units, spring quarter (Franzini) TTh 10, Th 1–4

127. Engineering Surveys.—The application of surveying to engineering problems. Horizontal and vertical curves. Reconnaissance, preliminary, location and construction surveys for highways and railroads. Photogrammetry in engineering surveys. Construction surveys for buildings and structures. Earthwork computations. Prerequisite: C.E. 20.

3 units, autumn quarter (Oglesby) T 11, TTh 1–4

138. Specifications and Contracts.—Contract principles; varieties of construction contracts; principles of specification writing; study of composition and arrangement of a set of specifications; preparation of contracts for engineering services: engineering ethics and practice. Prerequisite: Junior standing.

3 units, autumn quarter (Oglesby) MWF 9

3 units, *winter quarter (Oglesby) MWF 11

150. Transportation Engineering.—A study of the basic problems of highway, railroad, and airport finance, planning, design, construction, and maintenance. Introduction to traffic engineering and safety engineering as they apply to transportation. Lectures, problems, inspection trips, and assigned reading. Open to engineering students having 90 quarter units of credit and to others by permission.

3 units, autumn quarter (Oglesby) TTh 9, M 1–4

151. Highway Engineering.—Continuation of C.E. 150, with particular emphasis on highway problems. Lectures, inspection trips, assigned reading. Prerequisite: C.E. 150. (May be scheduled concurrently with C.E. 155.)

3 units, spring quarter (Oglesby) WF 10, M 1–4

154. Construction Estimates and Costs.—A study of estimates and costs from the viewpoint of the contractor and construction engineer. Detailed

cost estimates including job costs, overhead costs, and indirect costs. Lectures, problems, and assigned reading.
3 units, winter quarter (OGLESBY) MWF 9

155. Construction Equipment and Methods.—A study of construction procedures and the equipment used in them. Job planning and scheduling, equipment selection, and related problems. Lectures, problems, field trips, and assigned reading. (May be scheduled concurrently with C.E. 151.)
3 units, spring quarter (OGLESBY) TTh 8, M 1–4

160. Hydrology.—Introduction to hydrology, hydrologic measurements, runoff computations, ground water, water law, reservoir design, frequency analysis.
3 units, autumn quarter (LINSLEY) MWF 10

161. Hydraulic Structures.—Dams, spillways, pipe lines, canals, hydraulic machinery, economy in hydraulic design, water purification, sewage treatment. Prerequisites: C.E. 106 and 160.
3 units, winter quarter (LINSLEY) MWF 8

162. Hydraulic Engineering.—A continuation of C.E. 160 and 161 with discussion of applications in irrigation, water supply, hydroelectric power, navigation, flood control, drainage, and sewerage. Prerequisite: C.E. 161.
3 units, spring quarter (LINSLEY) MWF 11

166. Elements of Sanitary Engineering.—A general course covering the elements of water purification, sewage treatment, refuse disposal. Open to senior and graduate engineering students and to others by permission.
3 units, spring quarter (FRANZINI) MWF 8

191. Concrete.—A study of the physical properties of concrete and its constituents (Limited to twenty students per section.)
3 units, winter quarter (———) T 1–5, Th 1–4; W 1–5, F 1–4
3 units, *spring quarter (———) M 1–5, W 1–4

192. Elementary Structural Analysis.—The study of stresses in beams and simple frame structures; influence lines; introduction to moment distribution. Prerequisite: C.E. 110. C.E. 114 also desirable.
3 units, winter quarter (WILLIAMS) TTh 11, F 1–4

193. Elements of Timber Design.—Study of the various factors involved in the design of timber structures. Analysis and design of joints built up with different types of metal connecting elements. Discussion of timber preservation. Detailed design of simple timber frame. Prerequisite: C.E. 110. Two lectures and one drafting period per week.
3 units, spring quarter (———) TTh 11, F 1–4

194. Elements of Steel Design.—Study of the design of different types of steel structures. Detailed analysis of riveted and welded joints. Design of members and joints of a simple frame to illustrate the use of steel sections and methods of connection. Prerequisite: C.E. 110.
4 units, autumn quarter (———) TThS 8, F 1–4

195. Soil Mechanics.—A limited study of soils as an engineering material. Physical properties, tests, assumed stress distributions under structures, settlement of structures, soil compaction. Three lectures and one laboratory period per week. Prerequisite: C.E. 114. (Course 114 may be taken concurrently.)
4 units, autumn quarter (WILLIAMS) MWF 11, T or W 1–4

196. Reinforced Concrete Design.—A study of the fundamentals of reinforced concrete design as applied to beams, columns and slabs. Application of specifications and building code requirements to design problems.
3 units, winter quarter (———) TTh 9, M 1–4

197. Foundations.—Discussion of soil investigations and bearing capacity of soils. Detailed designs of simple and combined footings and retaining walls

106. Mechanics of Fluids.—The statics and dynamics of incompressible fluids. Viscosity, fluid friction, laminar and turbulent flow. Flow in pipes and open channels. Measuring devices. Laboratory exercises. Prerequisite: C.E. [illegible].

[illegible] units, autumn quarter [illegible] MTThF 11; T or W 1-4
[illegible] units, *winter and *spring quarters [illegible] MTThF [illegible]; T or W 1-4
[illegible] units, summer quarter ——— MTThF [illegible]; M 1-4

[illegible]. Mechanics of Materials.—Strength and elastic properties of the ordinary materials of engineering construction. Simple tension, compression, and shear; flexure, deflection of simple beams, torsion; columns. Prerequisite: C.E. [illegible].

[illegible] units, autumn, *winter, and *spring quarters ——— MTThF [illegible]
4 units, summer quarter ——— MTThF 9

[illegible]. Mechanics of Materials Laboratory.—A laboratory course in which the student makes experiments to verify the theoretical principles learned in Course [illegible] and studies the properties of a number of materials experimentally. It must be taken concurrently with Course [illegible].

[illegible] unit, autumn, *winter, and *spring quarters [illegible]
W [illegible] and W or Th [illegible] or [illegible]
[illegible] unit, summer quarter ——— W [illegible]-4

114. Mechanics of Materials.—A continuation of Course [illegible] covering subjects such as: combined stresses, combined bending and twist in circular shafts, beams of two materials, statically indeterminate beams, impact, mechanical properties of materials, and special problems. Prerequisites: C.E. [illegible] and [illegible].

[illegible] units, autumn quarter ——— MWF [illegible]
[illegible] units, *spring quarter [illegible] MWF [illegible]

[illegible]. Advanced Surveying.—Adjustment of instruments, engineering astronomy and surveying, introduction to city surveying, base line measurement, triangulation, plane table. Prerequisite: C.E. [illegible].

[illegible] units, spring quarter [illegible] [illegible], Th 1-4

[illegible]. Engineering Surveys.—The application of surveying to engineering problems. Horizontal and vertical curves. Reconnaissance, preliminary, location and construction surveys for highways and railroads. Photogrammetry in engineering surveys. Construction surveys for buildings and structures. Earthwork computations. Prerequisite: C.E. [illegible].

[illegible] units, autumn quarter [illegible] T [illegible], Th 1-4

[illegible]. Specifications and Contracts.—Contract principles; varieties of construction contracts; principles of specification writing; study of composition and arrangement of a set of specifications; preparation of contracts for engineering services; engineering ethics and practice. Prerequisite: Junior standing.

[illegible] units, autumn quarter [illegible] MWF 9
[illegible] units, *winter quarter [illegible] MWF [illegible]

151. Transportation Engineering.—A study of the basic problems of highway, railroad, and airport finance, planning, design, construction, and maintenance. Introduction to traffic engineering and safety engineering as they apply to transportation. Lectures, problems, inspection trips, and assigned reading. Open to engineering students having 9[illegible] quarter units of credit and to others by permission.

[illegible] units, autumn quarter [illegible] Th [illegible], M 1-4

[illegible]. Highway Engineering.—Continuation of C.E. [illegible] with particular emphasis on highway problems. Lectures, inspection trips, assigned reading. Prerequisite: C.E. [illegible]. (May be scheduled concurrently with C.E. [illegible].)

[illegible] units, spring quarter [illegible] WF [illegible], M 1-4

[illegible]. Construction Estimates and Costs.—A study of estimates and costs from the viewpoint of the contractor and construction engineer. Detailed

cost estimates including job costs, overhead costs, and indirect costs. Lectures, problems, and assigned reading.
3 units, winter quarter (OGLESBY) MWF 9

155. Construction Equipment and Methods.—A study of construction procedures and the equipment used in them. Job planning and scheduling, equipment selection, and related problems. Lectures, problems, field trips, and assigned reading. (May be scheduled concurrently with C.E. 151.)
3 units, spring quarter (OGLESBY) TTh 8, M 1-4

160. Hydrology.—Introduction to hydrology, hydrologic measurements, runoff computations, ground water, water law, reservoir design, frequency analysis.
3 units, autumn quarter (LINSLEY) MWF 10

161. Hydraulic Structures.—Dams, spillways, pipe lines, canals, hydraulic machinery, economy in hydraulic design, water purification, sewage treatment. Prerequisites: C.E. 106 and 160.
3 units, winter quarter (LINSLEY) MWF 8

162. Hydraulic Engineering.—A continuation of C.E. 160 and 161 with discussion of applications in irrigation, water supply, hydroelectric power, navigation, flood control, drainage, and sewerage. Prerequisite: C.E. 161.
3 units, spring quarter (LINSLEY) MWF 11

166. Elements of Sanitary Engineering.—A general course covering the elements of water purification, sewage treatment, refuse disposal. Open to senior and graduate engineering students and to others by permission.
3 units, spring quarter (FRANZINI) MWF 8

191. Concrete.—A study of the physical properties of concrete and its constituents (Limited to twenty students per section.)
3 units, winter quarter (———) T 1-5, Th 1-4; W 1-5, F 1-4
3 units, *spring quarter (———) M 1-5, W 1-4

192. Elementary Structural Analysis.—The study of stresses in beams and simple frame structures; influence lines; introduction to moment distribution. Prerequisite: C.E. 110. C.E. 114 also desirable.
3 units, winter quarter (WILLIAMS) TTh 11, F 1-4

193. Elements of Timber Design.—Study of the various factors involved in the design of timber structures. Analysis and design of joints built up with different types of metal connecting elements. Discussion of timber preservation. Detailed design of simple timber frame. Prerequisite: C.E. 110. Two lectures and one drafting period per week.
3 units, spring quarter (———) TTh 11, F 1-4

194. Elements of Steel Design.—Study of the design of different types of steel structures. Detailed analysis of riveted and welded joints. Design of members and joints of a simple frame to illustrate the use of steel sections and methods of connection. Prerequisite: C.E. 110.
4 units, autumn quarter (———) TThS 8, F 1-4

195. Soil Mechanics.—A limited study of soils as an engineering material. Physical properties, tests, assumed stress distributions under structures, settlement of structures, soil compaction. Three lectures and one laboratory period per week. Prerequisite: C.E. 114. (Course 114 may be taken concurrently.)
4 units, autumn quarter (WILLIAMS) MWF 11, T or W 1-4

196. Reinforced Concrete Design.—A study of the fundamentals of reinforced concrete design as applied to beams, columns and slabs. Application of specifications and building code requirements to design problems.
3 units, winter quarter (———) TTh 9, M 1-4

197. Foundations.—Discussion of soil investigations and bearing capacity of soils. Detailed designs of simple and combined footings and retaining walls

of reinforced concrete. Discussion of pile foundation requirements and design. Study and application of building code requirements relative to foundation design and construction.
3 units, spring quarter (———) TTh 9, W 1–4

199. Directed Reading and Special Studies in Civil Engineering.—Open to senior students by permission.
Autumn, *winter, and *spring quarters (Staff) By arrangement

COURSES PRIMARILY FOR GRADUATE STUDENTS

207. Advanced Hydraulic Laboratory.—Advanced work to demonstrate theories and principles. Prerequisite: C.E. 106.
1 or more units, winter and *spring quarters (Vennard) By arrangement

208. Hydraulics of Pipe Lines.—Flow of incompressible fluids in pipes, modern theories of pipe friction, flow in pipe systems, unsteady flow, surge problems, water hammer. Prerequisite: C.E. 106.
3 units, winter quarter (Vennard) MWF 11

209. Hydraulics of Open Channels.—Varied flow, hydraulic jump, hydraulics of open flow structures: intakes, transitions, measuring flumes, spillways, culverts, etc. Waves and surges. Prerequisite: C.E. 106.
3 units, spring quarter (Vennard) MWF 8

215. Mechanics of Materials, Special Investigation.—Advanced course dealing with theoretical or experimental investigations. Prerequisite: C.E. 114. Open by permission only.
2 or more units, autumn, *winter, and *spring quarters (Williams) By arrangement

218. Engineering Diagrams.—Design and construction of nomographic charts. Individual work for qualified graduate students. Open by special permission of the instructor.
2 units, autumn, *winter, and *spring quarters (Niles) By arrangement

228. Special Engineering Surveys.—Individual investigation arranged to meet the needs of students who have had considerable experience in engineering surveys. (Field work can be done only when two or more students pursue the same work.) Open only by permission.
1 or more units (Franzini) By arrangement

230. Civil Engineering Economy.—Review of fundamentals of engineering economy with particular reference to problems of civil engineering design. Critical examination of current technical literature dealing with economic aspects of civil engineering projects, both public and private. Prerequisite: Industrial Engineering 130 or the equivalent.
2 units, winter quarter (Grant) TTh 9

256. Construction Problems.—Individual investigation. Prerequisites: C.E. 154 and C.E. 155, or equivalent experience and consent of the instructor.
2 or more units, spring quarter (Oglesby) By arrangement

257. Transportation Problems.—Individual investigation. Prerequisites: C.E. 150, and consent of the instructor.
2 or more units, autumn and winter quarters (Oglesby) By arrangement

260. Advanced Hydraulic Engineering.—A study of the techniques of applied hydrology. Unit hydrographs, runoff relationships, flood routing, measurement of stream flow, sediment sampling. Lectures, laboratory problems, and field work.
4 units, autumn quarter (Linsley) MWF 8 (one afternoon by arrangement)

261. Advanced Hydraulic Engineering.—Advanced problems in the design of water control works. Prerequisite: C.E. 260.
4 units, winter quarter (Linsley) MWF 10 (one afternoon by arrangement)

262. Advanced Hydraulic Engineering.—Continuation of C.E. 261. Prerequisite: C.E. 261.
4 units, spring quarter (Linsley) TTh 9 (two afternoons by arrangement)

290. Soil Mechanics Seminar.—Special studies of soil as an engineering material. Assigned reading or experimental work as required to suit special interest of student. Prerequisite: C.E. 195. Open by permission only.
2 units, spring quarter (WILLIAMS) By arrangement

292. Statically Indeterminate Structures.—Moment distribution, check procedures, variable section, secondary stresses, organization of methods of analysis, efficient methods of solution of typical problems.
3 units, winter quarter (BENJAMIN) MWF 8

293. Advanced Foundation Design.—Continuation of C.E. 197. Seminar and study of literature relating to modern design and construction of foundations for buildings and bridges. Prerequisites: C.E. 195 and 197.
2 units, autumn quarter (———) TTh 11

294. Arch Analysis.—A general course in the analysis of statically determinate and indeterminate arches; construction of influence lines for various arch forms, numerical and graphical methods of calculating redundant quantities, application to the design of a hingeless reinforced concrete arch. Prerequisites: C.E. 114, 196.
4 units, spring quarter (YOUNG) TTh 11 (and two afternoons by arrangement)

295. Harbor Structures.—Reading, seminar, and design; discussion of wharves, piers of timber and concrete, sea walls, and bulkhead walls. Factors affecting design and life of marine structures. Detailed design of a harbor structure to illustrate design principles. Prerequisites: C.E. 196 and 197.
3 units, winter quarter (———) By arrangement

296. Structural Dynamics.—A general course in vibration theory with particular reference to structures. Behavior of structures under shock and impulse loads. Prerequisites: C.E. 100*n* and E.M. 200.
3 units, winter quarter (YOUNG) MWF 11

297a. Advanced Structural Design.—Structural geometry, analysis of structures by deflected structures and statics, structural models, bridge analysis and design, bridge types and characteristics. Large bridge design problem.
4 units, autumn quarter (BENJAMIN) TTh 8, W 1–4

297b. Advanced Structural Design.—Continuation of C.E. 297*a*. Building design and construction: general aspects and details. Reinforced concrete analysis and design, introduction to prestressed concrete. Prerequisites: C.E. 297*a* and concurrent registration in C.E. 292.
4 units, winter quarter (BENJAMIN) TTh 8, W 1–4

297c. Advanced Structural Design.—Continuation of C.E. 297*b*. Design of buildings in steel and timber. Lateral load analysis and design, shear walls, diagonal sheathing, framing problems. Prerequisites: C.E. 297*a*, C.E. 292, C.E. 297*b*.
4 units, spring quarter (BENJAMIN) TTh 8, W 1–4

298. Prestressed Concrete Seminar.—Analysis and design of prestressed concrete, use in bridges and buildings. Prerequisite: C.E. 297*b*. Registration by permission only.
1 or 2 units, spring quarter (BENJAMIN) W 3

299. Directed Reading or Special Investigations in Civil Engineering.—Open only to graduate students by special permission.
Autumn, *winter, and *spring quarters (STAFF) By arrangement

300. Thesis.—Investigation of some engineering problem. Required of candidates for the degree of Engineer.
Autumn, *winter, and *spring quarters (STAFF) By arrangement

301. Thesis.—Dissertation. Required of candidates for the degree of Doctor of Philosophy.
Autumn, *winter, and *spring quarters (STAFF) By arrangement

ENGINEERING MECHANICS

[Courses of special interest to civil engineering students. For descriptions, see pages 81–83]

E.M. 200. Theory of Structures.

E.M. 201. Mechanics of Materials.

E.M. 205. Experimental Stress Analysis.

E.M. 206. Theory of Elastic Stability.

E.M. 211. Plasticity.

E.M. 224. Dynamics of Structures.

E.M. 241. Advanced Mechanics of Fluids.

E.M. 276. History of the Theory of Elasticity and Strength of Materials.

ELECTRICAL ENGINEERING

HUGH HILDRETH SKILLING, LELAND HERMON BROWN, JOSEPH SNYDER CARROLL, MARVIN CHODOROW, EDWARD LEONARD GINZTON, WILLIAM GEORGE HOOVER, WARD B. KINDY, JOSEPH MAYO PETTIT, KARL SPANGENBERG, FREDERICK EMMONS TERMAN, DAVID FEARS TUTTLE, JR., Professors

LEONARD FRANKLIN FULLER, Acting Professor

WILLIS WALTER HARMAN, ROBERT ARTHUR HELLIWELL, OSWALD GARRISON VILLARD, JR., DEAN ALLEN WATKINS, Associate Professors

HUBERT HEFFNER, LAURENCE ALBERT MANNING, Assistant Professors

ROBERT RUMSEY BUSS, DONALD I. CONE, HAROLD FARLEY ELLIOTT, JOHN V. N. GRANGER, DONALD BREWER HARRIS, WILLIAM R. HEWLETT, JESSE EDWARD HOBSON, WILLIAM RODGERS JOHNSON, JOSIAH PICKARD JOLLYMAN, STANLEY FRANCIS KAISEL, THEODORE MORENO, BERNARD MORE OLIVER, DAVID PACKARD, G. ALLAN SMITH, Lecturers

Undergraduate Electrical Engineering Program.—Students desiring to specialize in electrical engineering during their undergraduate period may do so by following the curriculum on pages 52–55. Variations of this curriculum are encouraged if there is good reason for change. Attention is also called to the Engineering Science curriculum on page 56.

Graduate Curricula.—The practice of the profession of electrical engineering requires broad ability in both scientific thinking and the art of working with men. As education for those who wish to engage in this profession with competence, four years of undergraduate study and at least one year of postgraduate study are strongly recommended. The undergraduate and graduate curricula at Stanford are planned to offer as much as possible of the breadth of education needed for leadership in the profession as well as knowledge of the physical sciences and the basic professional techniques.

Advanced Degrees.—A one-year program of graduate study in electrical engineering may lead to the degree of Master of Science.

An alternative fuller program, giving wider selection of engineering course work, more opportunity for study in the related fields of physics, mathematics, and engineering, and in particular more independent work and individual guidance, may lead to the degree of Engineer. This program is reserved for students of demonstrated ability. A considerable part of the six academic quarters required for this program is usually devoted to research in collaboration with other students and faculty of the department, and to individual study.

A student must file in the department office: (1) Application for candidacy for the Master's degree before the end of the first academic quarter of graduate study. (2) Application of candidacy for the Engineer's degree before the end of the first academic quarter of graduate study after the Master's degree has been received.

General regulations governing the degrees of Master of Science and Engineering will be found on pages 58–59.

The degree of Doctor of Philosophy is offered under the general regulations of the University (see *Information Bulletin*). The doctoral program, requiring a minimum of three years (nine quarters) of graduate study, is recommended for those with the desire and ability to make a life work of research or teaching.

A student should file in the department office: (1) Not later than the first autumn quarter after receiving the Master of Science degree, an application to take the departmental qualifying examination (given each winter quarter) for the degree of Doctor of Philosophy. (2) Application for candidacy for the degree of Doctor of Philosophy as soon as he has satisfied one of the language requirements by passing the necessary examination, and has passed the departmental qualifying examination.

Requirements may be summarized as follows: The student is to complete successfully (1) a minimum of three years of residence with graduate standing, one year of which must be at Stanford; (2) one or more qualifying examinations given by the faculty of the Electrical Engineering Department, beginning in the second year of graduate study; (3) an examination to show reading knowledge of a foreign language (usually German, although another language may be substituted if it is of greater value in the student's research);* (4) an oral examination near the completion of the doctoral program; (5) a dissertation, based on research, which must be a contribution to knowledge; (6) an approved program of courses in electrical engineering and allied subjects; and (7) an approved program of study and an examination in a minor subject, *or* an approved program of courses to provide breadth of study, as follows.

If the student does not have a formal minor subject, about one-fourth of the program of graduate study should be in departments other than Electrical Engineering. The graduate program for the doctorate will normally include mathematics courses in Advanced Calculus (Mathematics 130, 131, and 132, or equivalent) and physics courses in Introductory Mathematical Physics (Physics 111, 113, and 115, or equivalent),* and at least 12 to 21 units (depending on the field of specialization) of other Upper Division or graduate courses outside the Department of Electrical Engineering. Such courses shall be selected to form an integrated program, to be approved by the department. Reasonable variation from this requirement will be permitted provided the program is thereby strengthened. This program is to provide breadth of study in lieu of a formal minor and to permit waiving the requirement of a second foreign language. A student wishing to fulfill the requirements for a formal minor may elect to do so.

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* The University requirement of a second foreign language is waived by the Graduate Study Committee if a satisfactory program of advanced study is offered as a substitute. The substitute program must comprise not less than 15 units of work taken in schools or departments other than the student's major and minor departments, and the work must be done while the student has graduate standing.

Thus, a student of electrical engineering with no formal minor department will satisfy the requirement by taking the Advanced Calculus and Introductory Mathematical Physics courses listed above. A student of electrical engineering with a formal minor in either mathematics or physics would require an additional 6 units of work outside his major and minor departments.

Courses.—The Electrical Engineering Department offers graduate work in electric power and communication, with particular strength in the following fields:

- Electronic Engineering:
    - Radio Communication
    - Electron Tubes
    - Microwaves
    - Network Theory
    - Radio Propagation
- Power Transmission and High Voltage
- Illumination Engineering
- Electrical Engineering Administration

Most student programs include courses in several of the above-listed fields Descriptions of courses will be found in the following pages.

The Microwave Laboratory.—The Hansen Microwave Laboratory provides opportunity for study and research in the rapidly advancing fields of investigation that combine the scientific aspects of electrical engineering with physics. The laboratory is administered by a committee of faculty men from the departments of Electrical Engineering and Physics. Students are accepted from the departments of Electrical Engineering and Physics to take part in the work of the laboratory. The Microwave Laboratory work is additional and complementary to the courses in the department of Electrical Engineering and to the research in the Electronics Research Laboratory of the department of Electrical Engineering. It offers an important opportunity for electrical engineering students interested in ultra-high-frequency problems. (See page 77.)

Electronic Science Program.—Master's and Doctor's degrees carrying the designation "Electrical Engineering: Electronic Science" may be conferred upon students who combine exceptional competence in electrical physics and mathematics with an electronics program in the department of Electrical Engineering.

It is recognized that there is a professional place for engineers whose work is the application of science in the field of electronics. The proper education for such men emphasizes the development of scientific and mathematical analysis as well as engineering competence.

A student who wishes to be a candidate for a degree with the designation "Electrical Engineering: Electronic Science" should so indicate when he submits his application for candidacy for the degree (see "Graduate Programs," page 73). He should plan a program of study to include physics and mathematics courses well beyond the minimum required for an electrical engineering degree. The candidate for such a degree will be expected to show adequate ability in mathematics, physics, field and circuit theory, and electronics; he will not, however, be required to show professional competence in electrical power engineering.

This program is particularly called to the attention of those who have Bachelor's degrees in science or mathematics, or in engineering science, as well as graduates of professional electrical engineering curricula.

Electrical Engineering Administration.—By a special arrangement, graduate students of engineering are enabled to take courses in the Graduate School of Business. This may be done to an extent that depends on the interests of the student, and three arrangements may be distinguished.

While working toward the degree of Master of Science in electrical engineering, it is possible to take about one course each term in the School of Business without interfering with completion of the technical studies necessary for the degree.

The Master's degree carrying the distinction "Electrical Engineering: Administration" is conferred upon students who combine not less than 30 units of study in technical electrical engineering with 30 or more units of study in the Graduate School of Business. Four or five academic quarters are required to complete this program, which combines the technical education that is represented by the Master's degree in electrical engineering with a substantial amount of work in the School of Business.

The degree of Engineer is offered for an administration program. Six academic quarters are required, and a thesis is to be written. Work toward this degree is usually divided about evenly between the Schools of Business and Engineering. The thesis may be in either department, with proper approval.

Students wishing a degree with the designation "Electrical Engineering: Administration" should so indicate on the application for candidacy for the degree.

GRADUATE PROGRAMS

Regarding graduate admission and registration, see page 57 in this announcement. In preparing a program of graduate study the following four basic requirements should ordinarily be satisfied.

1. *Preparation*: Certain studies, ordinarily included in the undergraduate program, are necessary for proper understanding of advanced work. These include physics, mathematics (through integral calculus), mechanics (C.E. 99, 100*n*, 110, 112, and if possible 106), electrical circuits (E.E. 104, 105, 106), electronics (E.E. 150, 151, 152), electrical machinery (E.E. 102, 103*n*). If these courses, or their reasonable equivalent, have not previously been completed they should be taken as soon as possible, and the time needed to obtain an advanced degree may be increased.

2. *Fundamental Courses*: If the following courses have not been taken previously, they should be included in the graduate program: with a major interest in communication, E.E. 160, 161, 170, 171 (Electronic Circuits); with a major interest in power, E.E. 108 and 109 (Illumination), E.E. 124, 125, 126, 134, and 135; by all students, Physics 57 (Atomic Physics), E.E. 116 (Transients), 117 (Transmission Lines), 128 (Servomechanisms), and 270 (Elementary Electromagnetic Theory).

The faculty does not prescribe courses to be taken, other than those listed in paragraphs 1 and 2 above. *Each student prepares his own proposed program and submits it to the faculty for approval.* This is done in the first academic quarter of graduate study (modifications may be made later). The average course of study is about 16 or 17 units per quarter. In planning his program, the student will normally include E.E. 200 (Seminar) each quarter, and any courses in paragraphs 1 and 2, above, not previously taken. He should then review, for possible inclusion in his program, all courses offered by the Electrical Engineering Department, considering their relation to his major and minor objectives.

3. *Major:* The student should normally have a major objective in electrical engineering, related to the field in which he expects to earn his living immediately upon leaving college. It is not well to attempt to define this major objective too narrowly, but distinction may be made between an interest in: research and teaching: technical engineering (communication or power); engineering administration and sales.

4. *Minor*: Those working for advanced degrees are normally expected to take an average of at least one course per quarter outside of the Electrical Engineering Department. This outside work should be planned with a specific objective in mind, and can be thought of as representing a minor subject.

The choice of such courses will naturally depend on the student's major interest, and the following lists of courses are suggested for consideration in planning the minor program:

With a major interest in research: Mathematics 130, 131, 132, 201, 206, etc.; Physics 111, 113, 115, 141, 209, etc.; Chemistry 121, 171; C.E. 114; E.M. 201, 202, 203, 242; M.E. 160, 161.

For technical communication engineering: Mathematics 130, 131, 206; Physics 111, 113, 209; administration courses from the Civil or Mechanical Engineering Departments or the Graduate School of Business (see below).

For technical power engineering: Mathematics 130; E.M. 200, 201, 202, 203, 210, 241, 242; M.E. 106, 114*a*, *b*, *c*, 118, 123, 133, 134, 160, 161; C.E. 114, 160, 191, 208, 209; administration courses from the Civil or Mechanical Engineering Departments or the Graduate School of Business (see below).

With a major interest in administration: Business 202, 212, 213, 220, 248, 250, 260, 270, 303, 304, 365; C.E. 138; I.E. 108, 110, 120, 130, 133, 147, 220, 231, 234; M.E. 106.

LABORATORIES

Facilities for instruction and research include:

Electrical Machinery Laboratory
Harris J. Ryan High-Voltage Laboratory
Illumination Laboratory
Electronics Laboratory (for class instruction)
Electronics Research Laboratory
Microwave Laboratory (in co-operation with Physics)
Radio Propagation Laboratory
Servomechanisms Laboratory
Digital and analog electronic computers
Radio Club (W6YX)

FELLOWSHIPS, SCHOLARSHIPS, AND ASSISTANTSHIPS

The department each year awards a number of fellowships, scholarships, and assistantships which are available to graduate students. Detailed information concerning these may be obtained by addressing the Assistantship Committee of the Electrical Engineering Department.

COURSES PRIMARILY FOR UNDERGRADUATE STUDENTS

100. Principles of Electrical Engineering.—Introduction to the circuits of electrical engineering and related subjects. Power sources, circuit constants, impedance and complex algebra, polyphase systems. Emphasis is placed on the formulation of the system equations, their solution and interpretation. Prerequisites: Mathematics 22 or 42 and Physics 53 (Mathematics 22 may be taken concurrently).

3 units, autumn, *winter, *spring, or *summer quarter (autumn) MWF 8 or 11
(winter) MWF 8
(spring) MWF 10

102. Introduction to Electrical Machinery.—The practical use of electrical machines; particularly common industrial motors and generators, transformers, and instruments. The external characteristics rather than theory of operation are stressed in this course. Prerequisite: E.E. 100.

3 units, autumn, *winter, *spring, or *summer quarter
(autumn) Lec. TTh 8; Lab. M or T 1–4
(winter) Lec. TTh 8 or 11; Lab. M, T or W 1–4
(spring) Lec. TTh 8; Lab. M or T 1–4

103n. Principles of Electrical Engineering.—Introduction to electric and magnetic fields in engineering, and the theory of electrical machines. The magnetic circuit and its application in transformers, machines, and other electromechanical conversion devices. Prerequisite: E.E. 100, and preferably 102.
3 units, spring quarter Lec. TTh 10; Lab. Th or F 1–4

104, 105, 106. Electrical Engineering Circuits.—Analysis of circuits and networks in the steady state. Impedance, admittance, use of complex algebra. Application of Kirchhoff's laws in mesh and node equations; equivalent circuits; network theorems. Resonant circuits; coupled circuits; polyphase circuits; Fourier analysis; wave filters. Prerequisites for E.E. 104: Mathematics 23 or 43, Physics 53, E.E. 100 and preferably 103, and a C+ average in analytic geometry, calculus, physics, and electrical engineering courses taken (or special permission of the department). E.E. 100 may be taken concurrently with 104 by special permission.
104. 3 units, autumn quarter MWF 10
105. 3 units, winter quarter MWF 8
106. 3 units, spring quarter MWF 8

108. Illumination.—A survey of the illumination field, including artificial light sources, methods of measuring and controlling light, and the principles of applying artificial illumination. The following applications will be discussed: home, shop, office, street, and flood lighting. Prerequisite: E.E. 100.
3 units, autumn quarter MWF 8

108a. Architectural Illumination.—Light and color, light sources, light control and the design of lighting systems for homes, schools, and commercial and industrial buildings. Primarily for pre-architectural and education majors..
3 units, autumn quarter MWF 8

109. Illumination Laboratory.—The theory, design, and operation of photometers, reflectometers, illuminometers, etc., and the measurement of light sources, lighting fixtures, levels of illumination, reflection factors, transmission factors, etc. Prerequisite: E.E. 108.
3 units, winter quarter MW 1–4

116. Circuits: Transients.—Transient electric currents in simple networks. An oscillographic study of transient phenomena in the laboratory accompanies a discussion of the classic mathematical development of circuit theory from the differential equations. Prerequisite: E.E. 105.
3 units, winter quarter Lec. TTh 8 or 9; Lab. M or T 1–4

117. Circuits: Transmission Lines.—The differential equations of transmission lines and circuits with distributed constants; traveling wave solution; standing wave solution; trigonometric and hyperbolic functions of complex arguments; typical characteristics of lines in power, telephone, and radio practice; impedance matching; approximations valid at high frequency; lines as circuit elements. Prerequisite: E.E. 106.
3 units, autumn quarter MWF 9 or TThS 10

124, 125, 126. Electrical Machinery.—A course in theory and operation of electrical machines. Emphasis is on alternating-current machinery. Includes also direct-current generators and motors, and rectifiers. Prerequisites: E.E. 102, 103*n*, 106.
124. 3 units, autumn quarter MWF 10
125. 3 units, winter quarter MWF 9
126. 4 units, spring quarter MWF 9 and Lab.

128. Servomechanisms.—A study of systems, usually electromechanical, for precise and rapid control, as in aircraft, on shipboard, and in various industrial and military applications. Electronic, magnetic, hydraulic, and mechanical amplifiers and circuit elements are used. Intended particularly for electrical and mechanical engineering students. Prerequisites: E.E. 102, and E.E. 116 or M.E. 118 or Math. 130 or equivalent.
3 units, spring or *summer quarter (spring) TThS 8

134. **Electrical Machinery Laboratory.**—Laboratory work on alternating-current machines. E.E. 124 is to be taken concurrently if possible, although it may precede this course if necessary.
2 units, autumn quarter Lab. Th 1–4

135. **Electrical Machinery Laboratory.**—Laboratory work on electrical machinery. Emphasis is on the more common machines, including transformers, induction motors, etc. E.E. 125 is to be taken concurrently if possible, although it may precede this course if necessary. E.E. 134 is a prerequisite for 135.
2 units, winter quarter Lab. W 1–4

138. **Servomechanisms Laboratory.**—Laboratory work on servomechanisms. E.E. 128 should either precede or be taken concurrently.
2 units, spring or *summer quarter (———)

143. **Introduction to Electronics.**—A course to give familiarity with the use of electronic equipment, with particular attention to common, simple, and typical devices. Both communication and power applications are considered. This course is not primarily for electrical engineering students. Prerequisite: E.E. 100.
3 units, autumn or *spring quarter Lec. TTh 9; Lab. M or W 1–4

145. **Electrical Engineering Circuits.**—A special course of selected material from E.E. 104, 105, and 106 that will enable students who have not had these courses to meet the prerequisites of E.E. 117 and the 110 and 124 series. It will still be necessary to take E.E. 104, 105, and 106.
3 units, summer quarter

150, 151, 152. **Electronics.**—(Formerly 103*a*, *b*, *c*.) Vacuum-tube characteristics, retifiers, amplifiers, oscillators, modulators, demodulators, photoelectric and other tubes. The purpose of this course is to study elementary electronic systems which are basic to all communication and industrial applications. Prerequisite: E.E. 100 or Physics 93. E.E. 100 may be taken concurrently with 150 by special permission.
150. 3 units, autumn quarter Lec. TTh 8 or 10; one three-hour lab. weekly
151. 3 units, winter quarter Lec. TTh 8 or 9; one three-hour lab. weekly
152. 3 units, spring quarter Lec. TTh 8 or 10; one three-hour lab. weekly

160, 161. **Electronic Circuits.**—(Formerly E.E. 110 and 111.) A comprehensive coverage of circuits, tubes, and amplifiers, as used in radio engineering and also employed in other electrical engineering applications. Prerequisites for E.E. 160: E.E. 152, 106; additional prerequisite for E.E. 161, E.E. 117.
160. 3 units, autumn quarter MWF 11
161. 3 units, winter quarter MWF 11

162. **Radio Engineering.**—(Formerly E.E. 112.) Application of electronic circuits to systems of radio engineering. Includes material on propagation of radio waves, antennas, transmitters, receivers, and special applications. Prerequisites: E.E. 160, 161.
3 units, spring quarter MWF 11

170, 171, 172. **Electronic Measurements.**—A course, primarily laboratory, with 1 or 2 lectures a week, to give familiarity with the principles and methods of electronic measurements. E.E. 160 or 161 should either precede or be taken concurrently.
170. 3 units, autumn quarter Lec. TTh 9; one three-hour lab. weekly
171. 3 units, winter quarter Lec. TTh 11; one three-hour lab. weekly
172. 3 units, spring quarter Lec. TTh 11; one three-hour lab. weekly

COURSES PRIMARILY FOR GRADUATE STUDENTS

200. **Seminar.**—A weekly meeting for the discussion of special topics of current interest in electrical engineering.
1 unit, each quarter (VILLARD) Th 11

201. Power Systems.—Power-system computation under transient and unbalanced conditions: characteristics of machines, lines and transformers; system faults. The method of symmetrical components is applied. Prerequisites: E.E. 106, 125, and knowledge of simple transients. E.E. 136 is desirable, but may follow E.E. 201 if preferred.
3 units, winter quarter (HOOVER)

206. Electric Power Seminar.—A course to inform students regarding modern engineering practice in power system design and operation. Reference is made to current technical literature, and good engineering practice is considered. The class visits typical near-by power stations and other installations.
1 unit, autumn quarter (CARROLL)

[For description of Courses 209*p*–217*p*, see Physics 209–217, pages 249–250.]

209p. Boundary Value Problems in Electromagnetic Theory.—(Enroll in Physics 209.)
3 units, winter quarter (JAYNES)

210p. Advanced Microwave Theory.—(Enroll in Physics 210.)
3 units, spring quarter (JAYNES)

211p. Microwave Electronics I.—(Enroll in Physics 211.)
3 units, winter quarter (CHODOROW)

212p. Microwave Electronics II.—(Enroll in Physics 212.)
3 units, spring quarter (CHODOROW)

213p. Microwave Measurements I.—(Enroll in Physics 213.)
2 units, autumn quarter (GINZTON)

214p. Microwave Measurements Laboratory I.—(Enroll in Physics 214.)
3 units, autumn quarter (GINZTON)

215p. Microwave Measurements II.—(Enroll in Physics 215.)
2 units, winter quarter (GINZTON)

216p. Microwave Measurements Laboratory II.—(Enroll in Physics 216.)
2 units, winter quarter (GINZTON)

217p. Microwave Seminar.—(Enroll in Physics 217.)
1 unit, autumn, winter, and spring quarters (JAYNES)

220. Advanced Electronic Circuits I.—Tube and transistor circuit techniques for the diversity of waveforms and functions needed in pulse systems, instrumentation and computers.
3 units, autumn quarter (PETTIT)

221. Advanced Electronic Circuits II.—Tube and transistor amplifier analysis and design based on transient performance. Prerequisite: E.E. 235 or equivalent.
3 units, winter quarter (PETTIT)

222. Advanced Electronic Circuits III.—Applications of network theory to amplifying systems. Band-pass filter amplifiers. Noise.
3 units, spring quarter (PETTIT)

220L, 221L, 222L. Electronic Circuits Laboratory.—Advanced experimental techniques. Prerequisite: Concurrent or previous enrollment in corresponding lecture course, E.E. 220, 221, or 222.
220L. 2 units, autumn quarter (PETTIT AND STAFF)
221L. 2 units, winter quarter (PETTIT AND STAFF)
222L. 2 units, spring quarter (PETTIT AND STAFF)

225. Communication Seminar.—Student presentation and discussion of matters related primarily to communication engineering, but sometimes ranging afield. Prerequisite: graduate standing or permission of the instructor.
1 unit, autumn, winter, and spring quarters (SPANGENBERG, HARMAN) T 11

231, 232. Electron Devices.—Fundamentals of vacuum tubes and transistors. Flow of electrons over potential barriers including metal and semiconductor junctions and electron emission in vacuum. Extension of band theory of solids to explain external characteristics of junction and point-contact transistors. Electron motion and space charge effects in solids and in vacuum. Noise in electron devices. Internal theory of electron tubes at ordinary and ultra-high frequencies. Electron optics. Special electron tubes. Prerequisite: E.E. 270 or equivalent.

231.. 3 units, winter quarter (SPANGENBERG)
232. 3 units, spring quarter (SPANGENBERG)

235. Network Analysis.—Formulation of the integro-differential equations of linear, lumped-constant systems (primarily electric networks, but also mechanical, acoustical, and thermal systems). Solution and interpretation of these equations, with the aid of the complex frequency variable and the Laplace transformation. Prerequisites: Mathematics 24, E.E. 106 and 116.

3 units, autumn quarter (———)

236, 237. Network Synthesis.—The basic principles of system synthesis as exemplified in passive electric networks. A study of energy relations in such networks and the fundamental properties of physically-realizable driving-point immittances. Synthesis of two-terminal networks in various forms, with practical examples; the electric potential analogy. Properties and synthesis of four-terminal networks. Conventional and insertion-loss methods of filter design with the aid of conformal transformation and the potential analogy. Prerequisites: E.E. 235 and acquaintance with theory of functions of a complex variable.

236. 3 units, winter quarter (———)
237. 3 units, spring quarter (———)

238. Active-Network Theory.—General theory of linear systems containing active elements (particularly servomechanisms and feedback amplifiers): appropriate theorems and principles of mathematical analysis. Stability and related questions. Examples of uses of such systems and introduction to their synthesis. Prerequisites: E.E. 128, 237.

3 units, autumn quarter [Not offered in 1954–55]

240. High-Voltage Laboratory.—A general introductory course which, together with Course 241, includes the following subjects: the characteristics of sphere-gaps, point-gaps, and transmission line insulators with the application of high-voltage at power and high frequencies, and at impulse voltages; the fundamentals of corona formation about conductors; some of the properties of insulating oils and other insulating materials. Two lectures per week and six laboratory periods per quarter. Prerequisite: E.E. 103*n*.

3 units, autumn quarter (CARROLL)

241. High-Voltage Seminar.—Discussion of high-voltage engineering, transmission-line insulation, high-voltage transformers, cables, circuit breakers, etc.; methods of measurement at high voltage, and related problems.

2 or more units (CARROLL)

243. Relay Protection of Power Systems.—Fundamental principles of operation and general design practice of relay systems for protection of equipment and maintenance of service. Prerequisites: E.E. 106 and 201.

3 units, spring quarter (HOOVER)

251. Communication Theory.—An introduction to the statistical theory of communication systems, including studies of modulation, signal spectra, statistical descriptions of signals, information measurement and channel capacity, coding, statistical circuit analysis with signal plus noise, probabilistic theories of communication systems. Prerequisite: E.E. 161 or equivalent and preferably Mathematics 123.

3 units, winter quarter (HARMAN)

260. Illumination Seminar.—Discussions on current literature, research and developments in all branches of illumination engineering. Students desiring to do special research in illumination should register under this number.
2 or more units (BROWN)

270. Elementary Electromagnetic Theory.—An introduction to field theory: the elements of vector analysis, Maxwell's equations, plane and spherical waves, electrodynamic potentials, radiation, simple antennas, and wave guides. Prerequisites: Physics 53, Mathematics 24, normally senior or graduate standing.
3 units, autumn or *spring quarter (WATKINS)

271, 272. Applied Electromagnetic Theory.—Equations of static fields. Elementary boundary value problems. Maxwell's equations, high frequency potential and circuit concepts, and skin-effect. Propagation and reflection of electromagnetic waves. Waves guides and resonant cavities. Radiation and antennas. Prerequisite: E.E. 270.
271. 3 units, winter quarter (WATKINS)
272. 3 units, spring quarter (WATKINS)

275. Radio Propagation.—The effect of the ionosphere on radio propagation, including a discussion of the transmission properties of ionized media based on Maxwell's equations. Other topics to be included are: measurement of ionosphere characteristics and the interpretations of results; the normal and abnormal space and time variations of the characteristics; ionosphere predictions; applications of principles to the solution of problems involving maximum usable frequencies, attenuation of sky waves, angles of arrival, etc.; special effects, such as meteoric ionization and moving ionospheric clouds. Prerequisite: E.E. 112; 270 (desirable, but not required).
3 units, summer quarter (HELLIWELL)

290. Special Studies in Electrical Engineering.—Electrical engineering professional papers, equipment research, or special problems, etc.
(FACULTY MEMBERS AS ASSIGNED)

295. Electrical Engineering Instruction.—Open to a very limited number of electrical engineering students who plan to make teaching their career.
Autumn, winter, or spring quarter (HARMAN) By arrangement

296. Electrical Engineering Instruction Seminar.—Weekly discussions of problems for the guidance of those who intend to make a profession of engineering teaching. Open to all.
1 unit (HARMAN AND STAFF) By arrangement

297. Special Seminar.—Discussion meetings arranged by certain faculty members.
1 unit By arrangement

300. Thesis.
(FACULTY MEMBERS AS ASSIGNED)

[**Numerical Methods and Theory and Operation of Computing Machines.**—See Mathematics 137, 138, 139.]

[**Advanced Atomic Physics and Physics of Solids.**—See Physics 181, 105.]

DIVISION OF ENGINEERING MECHANICS

STEPHEN P. TIMOSHENKO (Chairman), JAMES NORMAN GOODIER, LYDIK SIEGUMFELDT JACOBSEN, KARL KLOTTER, DONOVAN HAROLD YOUNG, *Executive Committee*

Organization.—Within recent years, mechanics has become a very important field of graduate study in engineering and the demand from industry for men specially trained in this field is continually increasing. The Divisi neering Mechanics has been set up to administer graduate study in this field for students whose major interests and ability lie in the more theoretical aspects of engineering. Thus it leads, naturally, toward a career in research (either in industry or scientific institutes) or in university teaching. Students aiming at professional practice of aeronautical, civil, or mechanical engineering may find the programs of graduate study in these departments more suited to their interests.

Admission and Registration.—After receiving the Bachelor's degree in engineering (or an acceptable equivalent), a student is eligible to apply for admission to the Division of Engineering Mechanics. Upon approval of the Division, School, and University Committee on Graduate Study, he will be accepted as a candidate for the Master of Science or the Doctor of Philosophy degree. For details of procedure and general requirements see pages 57–60.

Requirements for the M.S. Degree.—In order to secure the recommendation of the Division for the Master's degree, a candidate must present a minimum of 6 graduate units in each of the four subdivisions: (1) Advanced Dynamics, (2) Elasticity, (3) Fluid Mechanics, and (4) Mathematics. In addition to these 24 units of required courses, the program calls for a minimum of 12 units in approved electives and 9 units in free electives, making in all 45 units of course work. No thesis is required of the Master's degree candidate. In all of this work a minimum grade-point average of 2.75 is expected.

The program assumes that the student is adequately prepared to undertake graduate study in engineering mechanics and that he has already had the equivalent of the following Stanford courses: C.E. 114 (Advanced Strength of Materials), Mathematics 130 (Ordinary Differential Equations), M.E. 160 and 161 (Vibration Problems and Dynamics of Machinery). A student who, at the time of admission, is deficient in any or all of these 12 units will be required to make them up during his graduate study; in which case, more than the three quarters of residence normally required to complete the program may be necessary.

Requirement for the Ph.D. Degree.—The degree of Doctor of Philosophy is offered under the general regulations of the University (see *Information Bulletin*). The program of study requires a minimum of three years (nine quarters) of graduate study, at least one year of which must be at Stanford. The first year is represented by the M.S. program described above. The second year will be devoted principally to additional courses of graduate study, and the third to the production of an acceptable thesis. The program of study will be arranged by the candidate in consultation with the faculty member who will direct his thesis work and must be approved by the Executive Committee of the Division. Other requirements may be briefly summarized as follows: (1) One or more qualifying oral examinations given by the faculty of the Division of Engineering Mechanics some time early in the second year of graduate study; (2) an examination to show a reading knowledge of at least one* foreign language (usually German); (3) a university oral examination near the completion of the doctoral program (third year); (4) an examination in a minor subject.†

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* The University requirement of a second foreign language is waived by the Graduate Study Committee if a satisfactory program of advanced study is offered as a substitute. The substitute program must comprise not less than 15 units of work taken in schools or departments other than the student's major and minor departments, and the work must be done while the student has graduate standing.

† The University Committee on Graduate Study and the Division of Engineering Mechanics provide the alternative of a Ph.D. degree without a minor, provided the program of study contains a block of course work showing breadth of training, i.e. outside the mechanics field, and essentially equivalent to a minor.

Research Programs.—Supplementing the formal courses offered (see following pages for detailed descriptions) the division operates a number of government sponsored research projects with which graduate students may become associated for their thesis research. These programs include experimental and theoretical investigations in: vibration problems, elasticity, nonlinear mechanics, elastic stability, plasticity, structures, and fluid mechanics. These programs offer the student a real opportunity to gain valuable research experience in parallel with his course work.

Equipment.—Facilities for experimental work in the fields of Engineering Mechanics exist in the division's own laboratory as well as in the laboratories of the Civil and Mechanical Engineering Departments.

GRADUATE COURSES

200. Theory of Structures.—General principles of mechanics fundamental to the analysis of structures. Principle of virtual work, energy theorems, and slope-deflection equations with applications to deflections of beams and trusses, evaluation of statically indeterminate quantities, construction of influence lines, temperature stresses, etc. Prerequisite: C.E. 114.
3 units, autumn quarter (YOUNG) MWF 9

201. Mechanics of Materials.—Advanced problems in strength of materials. The beam on an elastic foundation with application to problems in mechanical and structural engineering. Stress and deformation in curved bars. Stress in thick-walled tubes due to pressure and heating. Rotation stress in disks and cylinders. Stress concentration due to fillets, notches, and holes. Prerequisite: C.E. 114.
2 units, autumn quarter (GOODIER) TTh 11

202a. Theory of Elasticity.—Stress and strain in three dimensions. Plane stress and plane strain. Rectangular, circular and ring-shaped plates and cylinders. Effects of small holes. Local edge loadings. Tapered plates. Solutions by complex variable. Elliptic holes, groups of holes, hyperbolic notches. Prerequisites: C.E. 114, M.E. 118.
3 units, winter quarter (GOODIER) MWF 10

202b. Theory of Elasticity.—Continuation of E.M. 202*a*. General analysis of, and tensor character of, stress and strain. Torsion of non-circular sections, and of non-uniform shafts. Flexure. Axially symmetric states. Contact of spheres and cylinders. Stress wave propagation. Prerequisite: E.M. 202*a*.
3 units, spring quarter (GOODIER) MWF 10

205. Experimental Stress Analysis.—Introduction to some of the more common experimental methods of investigating stress distribution. Photoelasticity, static and dynamic strain gage techniques, brittle lacquers and membrane analogy as applied to such investigations. Open to undergraduates by special permission only.
3 units, winter quarter (WILLIAMS) TTh 10 (and one lab. by arrangement)

206a. Theory of Elastic Stability.—Stability analysis of bars under separate or combined axial lateral and torsional loading, by solution of differential equations and by energy approximations. Prerequisites: C.E. 114, M.E. 118.
2 units, winter quarter (GOODIER) TTh 11

206b. Theory of Elastic Stability.—Continuation of E.M. 206*a*. Buckling of rectangular plates. Stability problems in the theory of elasticity. Prerequisite: E.M. 206*a*.
2 units, spring quarter (GOODIER) TTh 11

207. Theory of Plates.—Analysis of stress and deformation in plates bent by transverse loads. Applications to circular, rectangular, and other shapes. Vibrations of plates. Prerequisite: C.E. 114.
3 units, winter quarter (FLÜGGE) TWTh 1

208. **Theory of Shells.**—Direct stresses in shells with axial symmetry. Application to shell roofs and tanks. Cylindrical shells, shell roofs, and pipe lines. Stress-function and relaxation methods. Bending stresses in shells. Prerequisites: E.M. 201 and 207.
3 units, spring quarter (FLÜGGE) MWF 9

209. **Applied Elasticity.**—Selected problems in stress analysis and structural stability with special consideration of lightweight construction. Stability of plates and shells. Plates stressed beyond the critical load. Shear lag in plane stress. Effects of end constraint of tubes and box beams. Stresses in monocoque structures. Prerequisites: E.M. 206*a* and 207.
3 units, autumn quarter (FLÜGGE) MWF 9

211. **Plasticity.**—Mechanical behavior and stress-strain analysis of materials loaded beyond the range of Hooke's law. Strength and strength theories of brittle and ductile materials. Hysteresis and fatigue. Plastic deformation of single crystals and polycrystalline minerals. Flexure and torsion of bars. Residual stresses and their determination. Creep of metals at high temperatures. Prerequisite: C.E. 114.
3 units, winter quarter (TIMOSHENKO) MWF 11

212. **Theory of Plasticity.**—Stress-strain relations. Thick-walled tube. Torsion of bars. Plane strain and stress. Stability. Creep. Limit design. Technological processes. Prerequisites: E.M. 202*a*, 202*b*, and 211.
3 units, spring quarter (———) MWF 8

221. **Advanced Dynamics.**—Dynamics of a particle. Differential equations of motion, with emphasis on graphical and numerical methods of integration. Applications to practical problems. Problems of relative motion. Prerequisites: M.E. 118 (or Math. 130) and M.E. 160.
2 units, autumn quarter (YOUNG) TTh 9

222. **Advanced Dynamics.**—Dynamics of a system of particles. General theorems of momentum and energy with applications to variable mass systems, impact, vibration problems, etc., and in particular to motion of the gyroscope. Prerequisites: M.E. 118 (or Math. 130) and M.E. 160.
2 units, winter quarter (YOUNG) TTh 9

223. **Advanced Dynamics.**—Generalized co-ordinates, Lagrangian equations, Hamilton's Principle, with applications particularly in the field of vibration problems. Prerequisite: E.M. 222.
2 units, spring quarter (YOUNG) TTh 9

224. **Dynamics of Structures.**—The behavior of elastic structures subjected to dynamic loads. Vibrations of buildings, bridges, ships, and dams excited by earthquakes, wind, and traffic. Prerequisite: M.E. 160.
3 units, spring quarter (JACOBSEN) By arrangement

231. **Non-Linear Oscillations.**—Free, forced, and self-excited oscillations in mechanical systems and electrical circuits having non-linear characteristics. Relaxation oscillations, response curves, stability considerations. Prerequisite: M.E. 160, or equivalent.
2 units, winter quarter (KLOTTER) TTh 2

232. **Non-Linear Oscillations.**—Special features: Subharmonics, superharmonics, frequency multiplication and demultiplication, entrainment of frequency, parametric excitation, retarded action. Systems of multiple degrees of freedom. Prerequisite: E.M. 231.
2 units, spring quarter (KLOTTER) TTh 2

241. **Advanced Mechanics of Fluids.**—Dimensional analysis and dynamic similarity, hydraulic models. Principles of fluid friction for the incompressible fluid: laminar and turbulent flow in tubes, boundary layers, and through porous media. Cavitation.
3 units, autumn quarter (VENNARD) MWF 10

242. Mathematical Hydro- and Aerodynamics.—An introduction to the mathematical analysis of fluid motions. The Eulerian equations of motion. Bernoulli's theorem. Steady nonviscous motion in two dimensions. Conformal transformations. Lift on airfoils. Prerequisites: C.E. 106, M.E. 118.
3 units, spring quarter (Flügge-Lotz) MWF 1

243. Mathematical Hydro- and Aerodynamics.—Continuation of E.M. 242. Three-dimensional flow in frictionless fluid. Apparent mass. Motion and stability of vortex filaments. The three dimensional aspects of flow about an airfoil. Prerequisite: E.M. 242.
3 units, autumn quarter (Flügge-Lotz) M 1, TTh 10

244. Mathematical Hydro- and Aerodynamics.—Continuation of E.M. 243. Influence of compressibility and viscosity on fluid flow. General theorems and methods of computation. Boundary layer theory. Prerequisites: E.M. 243, or M.E. 238*b*, or E.M. 242 and M.E. 238*a*.
3 units, winter quarter (Flügge-Lotz) MWF 11

250. Mathematical Methods in Engineering Mechanics.—An introduction to Fourier series and complex variables, by solution of selected illustrative problems in solid and fluid mechanics—e.g., vibrations of taut wires, stress waves in rods, streamline patterns. Prerequisite: M.E. 118, or equivalent.
3 units, autumn quarter (Goodier) MWF 11

251. Mathematical Methods in Engineering Mechanics.—A continuation of E.M. 250. Selected problems, such as vibration of membranes and heat flow in cylinders, illustrating the properties and use of Bessel functions and spherical harmonics. Variational methods and principles.
3 units, winter quarter (Klotter) MWF 8

252. Numerical Methods in Engineering Mathematics. — Theoretical background and practical aspects of numerical methods of analysis. Linear equations. Ordinary differential equations. Fourier analysis. Partial differential equations. Integral equations.
3 units, spring quarter (Flügge) M 1, TTh 8

270. Special Problems in Engineering Mechanics.—A directed study course for graduate students on a subject of mutual interest to the student and a staff member. Student must find a faculty sponsor for this work before registering.
1 to 5 units, any quarter (Staff) By arrangement

275. Seminar in Solid Mechanics.—Problems in all branches of solid mechanics.
1 unit, autumn, winter, and spring quarters (Goodier) Th 4

276. History of the Theory of Elasticity and Strength of Materials.—(Formerly M.E. 273.) Strength of materials in the seventeenth century, Galileo, Hooke, and Mariotte. In the eighteenth century, J. Bernoulli, Euler, Coulomb, and Girard. First half of the nineteenth century, Navier, Saint Venant, Lamé, Barlow, and F. Neuman. Second half of the nineteenth century, Bresse, Boussinesq, Stokes, Maxwell, W. Thomson, Rankine, Kirchhoff, Clebsch, Mohr, and Wöhler. Recent developments in Theory of Elasticity, Theory of Vibration, and Theory of Stability, and in Strength of Materials and Theory of Plasticity.
3 units, autumn quarter (Timoshenko) [Not given in 1954–55]

301. Thesis.—Dissertation for the degree of Doctor of Philosophy.
Autumn, winter, and spring quarters (Staff) By arrangement

INDUSTRIAL ENGINEERING PROGRAM

WILLIAM GRANT IRESON (Chairman), EUGENE LODEWICK GRANT, GERALD J. LIEBERMAN, PAUL T. NORTON, JR., *Committee on Industrial Engineering*

EUGENE LODEWICK GRANT, Professor of Economics of Engineering
WILLIAM GRANT IRESON, Professor of Industrial Engineering
GERALD J. LIEBERMAN, Assistant Professor of Statistics and Industrial Engineering
PAUL THORNLEY NORTON, JR., Lecturer

Undergraduate Industrial Engineering Program.—The program leading to the degree of Bachelor of Science in industrial engineering is given on page 56. This curriculum is planned to serve those students whose long-run objective is administrative work in enterprises where a scientific and engineering background is necessary or desirable. The fundamentals of engineering are stressed; 72 percent of the program is common to all of the engineering curricula and an additional 10 percent is of technical nature in engineering, mathematics, and statistics. The remaining 18 percent consists of courses in a number of fields that are important as preparation for management activities.

Service Courses for Other Curricula.—Many of the courses listed under industrial engineering are introductory courses in management subjects. These are appropriate electives for students in the more technical fields of engineering as well as in certain other departments of the University. The introductory course in engineering economy, I.E. 130, is required of all engineering students.

Graduate Work.—A program leading to the degree of Master of Science in industrial engineering is offered for those students who wish to do advanced work in this field. The program emphasizes the analytical approach to industrial engineering problems using quantitative measures. Specialized work is available in engineering statistics (including quality control); this includes a number of courses in the Departments of Statistics and Mathematics. Special emphasis may also be given to engineering economy and related fields. Ordinarily the Master's degree program requires one year of graduate work.

Those students who enter the M.S. program in industrial engineering after receiving a Bachelor's degree in some other field of engineering will be required to make up certain basic undergraduate industrial engineering courses. A detailed statement of requirements for the M.S. degree and representative graduate programs directed toward engineering statistics and engineering economy may be secured from the Chairman of the Committee on Industrial Engineering.

Other graduate programs that appropriately may follow undergraduate work in industrial engineering include the following: Graduate School of Business; Department of Statistics.

UNDERGRADUATE COURSES

100. Industrial Organization and Management.—A study of the organizational structure of industrial enterprises and the principles and procedures of modern industrial management.

3 units, autumn quarter (———) MWF 8
3 units, *winter and *spring quarters (IRESON, MCGHIE) MWF 10

108. Time and Motion Study.—Principles and techniques of methods improvement by analysis of motion and time. Fundamentals of time study and the development and use of time standards for estimating, scheduling, time

control, and cost control. Laboratory practice in techniques and applications. Prerequisite: I.E. 100, or equivalent.
4 units, autumn quarter (———) MWF 10 and W or F 1–4

110. Production Control.—A study of the principles and methods of controlling materials, machines, and men in modern manufacturing enterprises. Prerequisite: I.E. 108.
4 units, winter quarter (———) MWF 9 and W 1–4

120. Quality Control by Statistical Methods.—The use of the techniques of statistics in the control of quality of manufactured product. Basic statistical concepts. The Shewhart control charts. Introduction to probability theory with applications to sampling acceptance procedures.
4 units, autumn quarter (Lieberman) MTWF 8
4 units, *winter quarter (Grant) MTWF 11

130. Engineering Economy.—The comparison of the relative economy of engineering alternatives. Open to those who have 90 units of credit and to others by permission.
3 units, autumn quarter (Ireson) MWF 10
3 units, *winter quarter (Ireson) MWF 8 and 12
3 units, *spring quarter (Lieberman) MWF 9 and 12

133. Accounting in Engineering.—A brief survey of accounting principles followed by a discussion of cost-finding problems of interest to engineers. (Students who have taken or are taking a university course in elementary accounting are admitted to this course only by special permission of the instructor.)
3 units, winter quarter (McGhie) TThS 10
3 units, spring quarter (Grant) MWF 8

133a. Accounting in Engineering.—An alternative to Course 133 involving similar problems and practice sets. The two extra lecture hours per week permit giving more attention to such matters as the use of standard costs in cost accounting, fixed capital accounting and depreciation, budgetary control, and the interpretation of financial statements.
5 units, autumn quarter (Grant) MTWThF 11

147. Production Engineering.—A study of the engineering aspects of preproduction planning. Topics covered include: product design for economical manufacture; allowances, tolerances, and interchangeability; production drawings, standards, and specifications; equipment selection; operation methods; tools, jigs, and fixtures; assembly and inspection procedures; plant facilities; materials handling and plant layout. Visits to manufacturing plants. Prerequisites: M.E. 103, I.E. 110.
4 units, spring quarter (Ireson) MWF 11 and Th 1–4

COURSES PRIMARILY FOR GRADUATE STUDENTS

200. Seminar.—Weekly meetings for the discussion of problems in management, production, and economics of industry. Each student is responsible for at least one report.
1 unit, winter quarter (———) F 1–3

202. Job Evaluation.—A study of methods and techniques employed in job analysis, job descriptions, evaluation and merit rating systems. The use of job evaluation in collective bargaining, establishment of wages and salaries, and wage and salary control. Prerequisites: I.E. 108, Psychology 192, or equivalents. Psychology 192 may be taken concurrently.
4 units, winter quarter (———) MWF 11 (and one afternoon by arrangement)

208. Advanced Time and Motion Study.—Current problems of technique and application in time and motion study. Individual or group projects in indus-

trial applications. Prerequisites: I.E. 108 and 120, or a course in statistics. Two lectures per week and two afternoons of laboratory by arrangement.
4 units, spring quarter (———) TTh 8 (and two afternoons by arrangement)

220. Quality Control Applications.—Current practices in industrial quality control. Problems of application of statistical quality control methods in various industries. Prerequisite: I.E. 120.
4 units, spring quarter (IRESON) MWF 8 and W 1–4

230. Advanced Engineering Economy.—Applications of engineering economy to problems of manufacturing industry and public utilities. Formulas for economy as tools for operations analysis. Relationship between accounting and engineering economy. Cost reduction and control. Income tax aspects of economy studies.
3 units, autumn quarter (GRANT) MWF 9

231. Problems in Engineering Economy.—Independent study of a selected problem in engineering economy. Prerequisites: I.E. 130, and consent of the instructor.
1 or more units (STAFF) By arrangement

234. Valuation and Depreciation.—The general principles involved in any engineering appraisal of fixed capital assets. Mortality studies for physical property. Accounting and income tax aspects of depreciation. Appraisal aspects of depreciation.
4 units, spring quarter (GRANT) MTWF 11

247. Advanced Production Engineering.—Advanced problems in factory planning, materials handling, production-line techniques, automation, and plant facilities. Economic factors in product design and selection of production methods. Prerequisite: I.E. 147 or equivalent.
3 units, autumn quarter (IRESON) TTh 9 (and one afternoon by arrangement)

252. Introduction to Operations Research.—Application of mathematical methods to industrial problems. Mathematical models developed and practiced by civilian and military operations research teams. Introduction to linear programming. Prerequisites: Statistics 110 or the equivalent and permission of the instructor.
3 units, winter quarter (LIEBERMAN) MWF 10

291. Industrial Engineering Problems.—A directed study course on a subject of mutual interest to the student and a staff member. Student must find a faculty sponsor for this work.
1 or more units (STAFF) By arrangement

MECHANICAL ENGINEERING

WILLIAM FREDERICK DURAND, STEPHEN P. TIMOSHENKO, Professors Emeriti

JAMES BENNETT LIGGETT, THERON JOSIAH PALMATEER, Teaching Specialists Emeriti

LYDIK SIEGUMFELDT JACOBSEN, WILHELM FLÜGGE, JAMES NORMAN GOODIER, BOYNTON MORRIS GREEN, KARL KLOTTER, ALEXANDER LOUIS LONDON, ALFRED SALEM NILES, ELLIOTT GRAY REID, J. KENNETH SALISBURY, Professors

HANS FREDERIK BIRNIE, WILLIAM MORROW KAYS, Associate Professors

STEPHEN JAY KLINE, ALBERT ABBE ROWE, Assistant Professors
FRANK ROBERT ARNOLD, Acting Assistant Professor
IRMGARD FLÜGGE-LOTZ, Research Associate and Lecturer
JAMES ALLAN JAMIESON BENNETT, DEAN RODEN CHAPMAN, MAXWELL ALFRED HEASLET, ROBERT THOMAS JONES, HARVARD LOMAX, JOHN ROBERT SPREITER, JOSEPH STUART III, MILTON DENMAN VAN DYKE, WALTER GUIDO VINCENTI, Lecturers in Aeronautical Engineering
CARL GEORGE ARTHUR ROSEN, Lecturer in Mechanical Engineering
WILLIAM RUFUS HANCOCK, ROBERT SIMPSON, Teaching Technicians

Undergraduate Mechanical Engineering Program.—Students desiring to specialize in mechanical engineering during their undergraduate period may do so by following the curriculum outlined on page 55.

Graduate Program.—The graduate work offered in this department is intended to prepare the student for a professional career in the broad aspects of mechanical engineering with especial emphasis placed on the analytical approach. Flexibility in the selection of courses is allowed provided that a certain minimum of fundamentally important courses is included. Ordinarily the Master's degree, requiring one year of graduate work, will not include a thesis and will not allow a great deal of specialization, since approximately three-fifths of the required 45 units will consist of courses designed to broaden the scientific and technical outlook of the student. If more technical specialization is desired, the professional degree of Engineer, representing two years of graduate work and including a thesis, or the academic degree of Doctor of Philosophy, normally requiring three years of graduate work, should be considered.

The department gives specialized work leading to careers in many mechanical engineering fields such as: power generation, process industries, machine design development, instrumentation and controls, public utilities, thermodynamic processes including nuclear energy problems, production control, and last, but not least, in mechanical engineering research and development.

Admission and Registration.—To be eligible for registration in the department a student must have received the Bachelor's degree in engineering, or an acceptable equivalent, and normally will be expected to have had all the Stanford courses listed either under the mechanical engineering or under the industrial engineering requirements for a Bachelor of Science degree, or their equivalents (see page 56). When circumstances make it advisable certain substitutions will be allowed.

Curricula.—The requirements for the degree of Master of Science in mechanical engineering are: The fulfillment of mechanical engineering requirements for the Bachelor's degree, and the following minimum prescribed courses or equivalents falling into four groups:

a) Mathematics, 6 units from E.M. 250, 251, 252, Math. 131, 132.
b) Rigid and Elastic Mechanics, 6 units from E.M. 201, *202a*, *202b*, *206a*, *206b*, 221, 222, 223.
c) Fluid Mechanics, 3 units from E.M. 241, 242, 243, 244.
d) Thermodynamics and Heat Transfer, 12 units from M.E. *231a*, *231b*, 232, 233, *238a*, *238b*, *238c*, and Chem. 171 and 173.

In addition to the above minimum of 27 units, 12 units of approved electives and 6 units of free electives are expected. It should be noted that students who have not fulfilled the mechanical engineering requirements for the Bachelor's degree will have to take additional units in undergraduate courses.

Candidates for the degree of Master of Science will be expected to have a minimum scholastic average of 2.75 in engineering courses to secure the department's recommendation for the degree.

The requirements for the Engineer's degree in mechanical engineering include an acceptable thesis for which as much as 15 units will be allowed. The thesis should be started not later than the second week of the last academic year of residence, and ordinarily will involve some experimental work. In addition to the thesis, 30 units of approved advanced course work are expected beyond the requirements for the Master of Science degree in mechanical engineering.

General University requirements for the degree of Doctor of Philosophy are set forth in the *Information Bulletin.* The department will allow a minor field of study but does not require one. However, if a minor is waived, the candidate must show breadth of training in engineering or in adjacent fields. In lieu of a second foreign language a group of courses, centering around an additional field of competence, may be offered; for instance, 15 units of Upper Division or graduate mathematics and physics courses (taken as a graduate student) will constitute an acceptable substitute for the second foreign language, but the same courses cannot be used to substitute for both the minor and the second foreign language.

All candidates for the advanced degrees of Engineer and Doctor of Philosophy in mechanical engineering will be expected to have a minimum scholastic average of 3.00 for work in engineering courses beyond those required for the Master's degree.

Courses.—The Mechanical Engineering Department, in collaboration with other departments of the University, offers specialized graduate work with particular strength in the fields of:

Thermodynamics and heat transfer
Elastic and plastic analysis of design elements
Dynamic problems of machine design
Fluid mechanics and gas dynamics
Problems of the process industries
Production engineering and quality control
Aircraft power plants and internal combustion engines.

Most graduate programs will include courses in several of the above listed fields.

Laboratory Facilities.—The Mechanical Engineering Laboratory is well equipped with representative hydraulic, steam, internal combustion, refrigeration, air conditioning, and pneumatic machinery for undergraduate testing. Modern examples of aircraft engines, rockets, gas turbines, and other machinery components are set up as demonstrations. Research facilities include adequate instrumentation, CFR engine test units, dynamometer facilities, a supersonic flow system for gas dynamic investigations, air duct flow systems for heat and mass transfer studies, and ample supplies of compressed air, electricity, steam, and water utilities. Machine shop equipment is available for student construction of research apparatus in the William Roberts Eckart Room.

The Mechanical Engineering Shops have facilities for experimental investigations in the fields of melting, heat-treatment, forming, and machining of metals.

The Timoshenko Laboratory of Engineering Mechanics and the Vibration Research Laboratory are equipped to accommodate a number of graduate students doing experimental research in the fields of mechanics and mechanical engineering.

Prize.—The income of the William Roberts Eckart Research Fund is available as an annual prize for the best Engineer's thesis offered by a student in the department.

UNDERGRADUATE COURSES

[Note.—Laboratory sections in experimental engineering will be assigned in groups. In so far as the laboratory schedule permits, students will be allowed, with due regard to priority of application, to arrange their own sections and laboratory periods. Enrollment with the instructor concerned, on registration day or the first day of University instruction, is essential in order that the laboratory schedule may be prepared. Enrollment later than the first week will not be permitted under any circumstances.]

1. Forging and Welding.—One four-hour laboratory period and one one-hour lecture per week. Approximately one-third of the term is devoted to forging and practical heat treating, with the remainder of the term devoted to the oxyacetylene and electric welding processes. Enrollment limited.
2 units, autumn quarter (Simpson) Lec. T 9 or Th 8; Lab. M, T, W, Th, or F 1–5
2 units, *winter quarter (Simpson) Lec. T 8 or Th 9; Lab. M, T, W, Th, or F 1–5
2 units,* spring quarter (Simpson) Lec. T 9 or Th 8; Lab. M, T, W, Th, or F 1–5

2. Foundry Practice.—One four-hour laboratory period per week. One additional hour per week is devoted to lecture, and arrangements for it must be made with the instructor. Enrollment limited.
2 units, autumn quarter (Hancock) Lec. T 8 or Th 9; Lab. M, T, W, Th, or F 1–5
2 units, *winter quarter (Hancock) Lec. T 9 or Th 8; Lab. M, T, W, Th, or F 1–5
2 units, *spring quarter (Hancock) Lec. T 8 or Th 9; Lab. M, T, W, Th, or F 1–5

3. Machine Shop Practice.—One four-hour laboratory period per week. One additional hour per week is devoted to lecture, and arrangements for it must be made with the instructor. Enrollment limited.
2 units, autumn quarter (Rowe) Lec. T 11 or Th 10; Lab. M, T, W, Th, or F 1–5
2 units, *winter quarter (Rowe) Lec. T 10 or Th 11; Lab. M, T, W, Th, or F 1–5
2 units, *spring quarter (Rowe) Lec. T 11 or Th 10; Lab. M, T, W, Th, or F 1–5

8. Machine Drawing.—A training in drafting technique and procedure, as applied to the production of drawings used in the machine-building industries. Consideration is given to drafting equipment and materials, lettering, orthographic projection, types and choice of views, layout technique, dimensioning, professional methods and standards. Detail and assembly drawings, tracings, and blueprints will be made. Two lectures and two three-hour drafting periods per week. Enrollment limited.
4 units, autumn and *winter quarters (Birnie) Lec. TTh 1; Dft. TTh or WF 2–5
4 units, *spring quarter (Birnie) Lec. MW 1; Dft. MW or TTh 2–5

10. Descriptive Geometry.—Space relations of points, lines, and surfaces. Intersections and developed surfaces. Theory and practical applications. Prerequisite: M.E. 8. Two lectures and two three-hour drafting periods per week. Enrollment limited.
4 units, autumn, *winter, and *spring quarters (Green)
Lec. TTh 11; Dft. TTh or WF 1–4

44. Engineering Computations and Measurements.—An introduction to engineering methods of measurement, and the organization, execution, and referencing of computations. Errors and elementary statistical theory. This course should be taken during the sophomore year. Prerequisite: Mathematics 21, which may be taken concurrently.
3 units, autumn quarter (Niles) TTh 1 (and one Lab. M or W 1–4)
3 units, *winter quarter (Niles) TTh 10 (and one Lab. T or W 1–4)

101. Advanced Welding and Heat-Treating.—Experiments with various types of heat-treating furnaces, high-frequency induction, salt bath treatment, and resistance welding. Open to engineering students who have completed M.E. 1. Minimum enrollment five, maximum ten.
2 units, autumn and *spring quarters (Simpson) Lec. and Lab. by arrangement

102. Advanced Foundry.—A study of pattern design, pattern making, and special molding problems. Open to engineering students who have completed M.E. 2. Minimum enrollment five, maximum ten.
2 units (HANCOCK) [Not given in 1954–55]

103. Advanced Machine Shop Practice.—Special work in the setup and operation of production machine tools. Open to engineering students who have completed M.E. 3. Minimum enrollment five, maximum ten.
2 units, autumn, *winter, and *spring quarters (ROWE)
One Lec. and one Lab. by arrangement

106. Industrial Processes.—Study of the application of forging, welding, casting and related processes in mass production. Prerequisite: M.E. 1, 2.
2 units, spring quarter [Not given in 1954–55]

112. Advanced Engineering Drawing.—Advanced work in descriptive geometry, engineering drawing, etc., according to the need of the student. Prerequisites: M.E. 8, 10.
2 to 4 units (BIRNIE) By arrangement

114a. Machine Design.—Review of strength of materials and endurance limits; materials; factors of safety; riveted and welded joints; screws; linkages. Three lectures and two three-hour design periods per week. Prerequisites: M.E. 8, C.E. 112. Enrollment limited.
5 units, autumn quarter (GREEN) Lec. TThS 10; Lab. TTh 1–4
5 units, *winter quarter (BIRNIE) Lec. TThS 10; Lab. TTh 1–4

114b. Machine Design.—Shafts; keys; couplings; belts; chains; cams. Three lectures and two three-hour design periods per week. Prerequisite: M.E. 114*a*. Enrollment limited.
5 units, winter quarter (GREEN) Lec. MWF 9; Lab. TTh 1–4
5 units, *spring quarter (BIRNIE) Lec. MWF 10; Lab. TTh 1–4

114c. Machine Design.—Gears; bearings; springs. Two lectures and two three-hour design periods per week. Prerequisite: M.E. 114*b*. Enrollment limited.
4 units, autumn quarter (BIRNIE) Lec. TTh 8; Lab. TTh 1–4
4 units, *spring quarter (GREEN) Lec. TTh 10; Lab. TTh 1–4

118. Differential Equations in Engineering.—In this course special attention is given to the setting up of the differential equation, the problems being drawn from various fields of engineering. Prerequisites: Mathematics 24; C.E. 106 and 110.
3 units, autumn quarter (JACOBSEN) MWF 11

122. Mechanical Engineering Laboratory.—Laboratory experiments on commercial hydraulic and thermal power apparatus designed: (1) to introduce the student to experimental methods in the field of mechanical engineering; (2) to demonstrate the validity of the principles and techniques described in M.E. 132; (3) to give the student the experience of analyzing his own experimental work and presenting the results in an acceptable engineering report; and (4) to provide the experience of joint group effort. Prerequisite: M.E. 132.
3 units, autumn quarter (KAYS, KLINE) M or T 1–4
3 units, *winter quarter (SALISBURY, KLINE) W or Th 1–4
3 units, *spring quarter (LONDON, ARNOLD) M, T, Th, or F 1–4

123. Mechanical Engineering Laboratory.—A continuation of M.E. 122. The student will work with experimental systems designed to illustrate individual principles as well as with examples of commercial equipment. Prerequisites: M.E. 122 and 133.
4 units, autumn and *spring quarters (LONDON, KLINE) M or W 1–4

132. Elementary Engineering Thermodynamics.—An introduction to the principles of thermodynamics with applications to thermal power systems.

This course is designed to provide a background for M.E. 122. Prerequisite: C.E. 106, or concurrent registration.
3 units, autumn quarter (London, Kays, Kline) MWF 9
3 units, *winter quarter (London, Kays, Kline) TThS 11
3 units, *spring quarter (London, Kays, Kline) MWF 8

133. Engineering Thermodynamics.—A thorough review of the basic principles of thermodynamics with applications to problems of engineering interest, such as the analysis of heat, power, and refrigeration systems; the flow of a compressible fluid; and the combustion of fuels. Prerequisite: M.E. 132.
3 units, autumn quarter (Kline) MWF 10
3 units, *winter quarter (London) MWF 11

134. Engineering Thermodynamics.—A continuation of M.E. 133 with the addition of the principles and applications of heat and mass transfer. Prerequisite: M.E. 133.
3 units, autumn and *spring quarters (London) MWF 8

140. History of Engineering.—Lectures on the development of engineering from ancient times to the present day. Preparation of a short report on the development of some phase of engineering of special interest to the student. Prerequisite: 90 units of credit, or special permission.
2 units, autumn quarter [Not given in 1954–55]

145. Elementary Airplane Structures.—Aeronautical practice in organization of bending moment computations and the analysis of plane trusses. Tension coefficients. Relations between loading, shear, and bending moment. Distribution of shear forces and relations between shear and normal stresses in thin-walled beams. Shear center location. Bending of beams of unsymmetrical cross section. Prerequisites: M.E. 44 and C.E. 114, which may be taken concurrently.
2 units, spring quarter (Niles) TTh 11

146. Introduction to Aerodynamics.—A résumé of the history of mechanical flight and brief consideration of the properties of the atmosphere and the classification of aircraft precede explanation of the principles of flight. Studies of basic aerodynamic laws, the mechanics of lift and drag, characteristics of airfoils and parasite resistance are then synthesized in elementary discussion of the stability, controllability, and performance of airplanes. Prerequisite: C.E. 106.
2 units, autumn quarter (Reid) TTh 8

160. Engineering Dynamics.—Thorough drill in engineering applications of d'Alembert's Principle. Practice in considering the simpler dynamic problems of engineering from the point of view of differential equations, with emphasis on the physical interpretation of the results. Vibration problems of one and of several degrees of freedom will be studied in detail. Prerequisites: M.E. 118 or Mathematics 130 and C.E. 110.
3 units, winter quarter (Jacobsen) MWF 10

161. Dynamics of Machinery.—Critical speeds, balancing, studies of energy fluctuations in reciprocating and rotating machinery, design problems. Prerequisite: M.E. 160.
3 units, spring quarter (Jacobsen) MWF 9

[**Engineering Mechanics (Statics).**—See Civil Engineering 99.]

[**Engineering Mechanics (Dynamics).**—See Civil Engineering 100*n*.]

[**Mechanics of Fluids.**—See Civil Engineering 106.]

[**Mechanics of Materials.**—See Civil Engineering 110.]

[**Mechanics of Materials Laboratory.**—See Civil Engineering 112.]

[**Mechanics of Materials.**—See Civil Engineering 114.]

COURSES PRIMARILY FOR GRADUATES

216. Advanced Machine Design.—Design of complete machines. Students may elect machine tools. cranes, steam or gas engines, or special problems. (Nine hours drafting per week.) Intended for students who have completed M.E. 114, 132, and 133.
3 units, winter quarter (BIRNIE, GREEN) By arrangement

230. Central Power Stations.—Design and performance analysis of steam power plants, with particular emphasis on the design of steam turbines and their cycles. Regenerative and reheat cycles and their application in modern central stations. Field trips and problems. Prerequisite: M.E. 133.
3 units, autumn quarter (SALISBURY) TTh 10 (trips by arrangement)

231a. Heat Transmission.—The application of the principles of heat transfer and thermodynamics to the solution of transient and steady state heat transfer problems. The methods of dimensional analysis and model experimentation, as well as strictly analytical procedures, are emphasized. Prerequisite: graduate standing.
3 units, autumn quarter (LONDON) MWF 9

231b. Heat Transmission.—A continuation of Course 231*a*.
3 units, winter quarter (LONDON) MWF 9

232. Experimental Problems in Heat Transmission.—A laboratory course for the investigation of problems of heat transmission. It will consist of approximately six problems involving the analytical prediction of performance of an idealized heat transfer system, experimental determination of behavior of the actual system, and a rationalization of the difference. No formal laboratory reports will be required. Prerequisite: M.E. 231*b*.
2 units, spring or autumn quarter (KAYS, LONDON) By arrangement

233. Advanced Engineering Thermodynamics.—Applications of the Second Law. The purpose of this course will be to illustrate the broad application of the Second Law principle in engineering thermodynamics. Different formulations of the Second Law will be examined critically, the availability concepts will be developed, and applications will be made to combustion, heat power, refrigeration, storage battery, multiple effect evaporation, and other systems. Prerequisite· M.E. 134, or graduate standing.
2 units, autumn quarter (KAYS) TTh 9

237a. Internal Combustion Engine Systems.—Thermodynamic analysis of different types of internal combustion engine cycles, including both reciprocating and steady-flow systems. Thermodynamics and kinetics of combustion reactions. Influence of operating variables on engine thermodynamic performance. Prerequisites: M.E. 134 or equivalent.
3 units, winter quarter (KAYS) MWF 10

237b. Internal Combustion Engine Systems.—A combined lecture-laboratory continuation of M.E. 237*a*. Lectures will include a more detailed study of the behavior of engine components with special emphasis on cooling, carburetion, injection, combustion, and control problems. Three laboratory experiments with reports. Two lectures per week. Laboratory by arrangement. Prerequisite: M.E. 237*a*.
4 units, spring quarter (SALISBURY) Lec. TTh 9; Lab. by arrangement

238a. Mechanical Engineering Applications of Fluid Mechanics.—Systematic development of the laws of thermodynamics and mechanics as applied to the continuous fluid medium. Applications to compressors, turbines, ducts, and cascades. Dimensional analysis. Lift and drag in terms of the behavior of fluids of small viscosity. The use of potential theory in the design of compressors and efficient ducts. Vorticity theorems of Kelvin and Crocco. Prerequisites: M.E. 133 and Mathematics 24.
3 units, autumn quarter (KLINE) MWF 8

238b. Gasdynamics.—Generalized one-dimensional compressible flow. The effects of area change, heat transfer, friction, normal shocks and mass transfer singly and in combination. Applications to ducts, nozzles, diffusers, jets and combustion chambers. Derivation of the Navier-Stokes equations. Inspectional analysis. Deduction of the boundary layer equations and introduction to the differential and integral methods of solution. Prerequisite: M.E. 238*a* or equivalent.
3 units, winter quarter (KLINE) MWF 11

238c. Gasdynamics.—A continuation of M.E. 238*b*. Topics of interest to the class will be selected from two-dimensional compressible flow and transient flow, or the detailed discussion of the design of turbo-machinery.
3 units, spring quarter (KLINE) MWF 8

SPECIAL RESEARCH

291. Engineering Problems.—A directed study course for graduate engineering students on a subject of mutual interest to the student and a staff member. This course may be used to prepare for experimental research during a later quarter under M.E. 292. Student must find a faculty sponsor for this work.
1 to 5 units, any quarter (STAFF) By arrangement

292. Experimental Investigation of Engineering Problems.—A course in which a graduate engineering student may undertake an experimental investigation under the guidance of a staff member. Previous work under M.E. 291 may be required to provide the background for the experimental program. Student must find a faculty sponsor for this work.
1 to 5 units, any quarter (STAFF) By arrangement

293. Seminar in Fluid Mechanics.—One meeting every two weeks throughout the year.
Autumn, winter, and spring quarters (STAFF) By arrangement

300. Thesis.—Investigation of some engineering problems. Required of candidates for the degree of Engineer.
2 to 15 units, any quarter (STAFF) By arrangement

301. Thesis.—Dissertation for the degree of Doctor of Philosophy.
Autumn, winter, and spring quarters (STAFF) By arrangement

AERONAUTICAL ENGINEERING

[Courses of especial interest to mechanical engineers.]

A.E. 234a, b, and A.E. 235a, b. Jet Propulsion Systems.

A.E. 240a, b, c. Aerodynamics.

A.E. 241a, b, c. Airplane Structures.

A.E. 251b, c and A.E. 252a, b. Aerodynamics of Compressible Flows.

ENGINEERING MECHANICS

[Courses of especial interest to mechanical engineers.]

E.M. 201, 202a, 202b. Mechanics of Materials and Theory of Elasticity.

E.M. 207. Theory of Plates.

E.M. 211. Plasticity.

E.M. 221, 222, 223. Advanced Dynamics.

E.M. 242, 243, 244. Mathematical Hydro- and Aerodynamics.

E.M. 206a, 206b. Theory of Elastic Stability.

FOOD RESEARCH INSTITUTE

JOSEPH STANCLIFFE DAVIS, Director Emeritus
VLADIMIR P. TIMOSHENKO, Professor Emeritus

MERRILL KELLEY BENNETT (*Director*), KARL BRANDT, HOLBROOK WORKING (*Associate Directors*), HELEN CHERINGTON FARNSWORTH, WILLIAM ORVILLE JONES, VERNON D. WICKIZER (*Economists*), Professors
JOSEPH STANCLIFFE DAVIS, VLADIMIR P. TIMOSHENKO (*Consultants*)
S. DANIEL NEUMARK (*Acting Economist*)
E. LOUISE PEFFER, BORIS CYRIL SWERLING (*Associate Economists*), Associate Professors
BRUCE F. JOHNSTON (*Acting Associate Economist*)
ROSAMOND H. PEIRCE (*Associate Statistician*)
JYOTI P. BHATTACHARJEE (*Acting Assistant Economist*)
HOBART N. YOUNG (*Research Associate*)
P. STANLEY KING (*Cartographer and Editorial Assistant*)

The Food Research Institute was established in 1921 under a grant from Carnegie Corporation of New York for study of production, distribution, and consumption of food. Its staff, while primarily engaged in research, offers to limited numbers of students instruction and guidance leading to the degrees of Master of Arts and Doctor of Philosophy, as indicated below. The Institute has its own special library designed to supply the needs of students of world problems of food and agriculture, and the collection of current periodicals from foreign countries is especially serviceable.

The products of research are currently published in the Institute's *Studies in Commodity Economics and Agricultural Policy, Studies in Tropical Development, Studies on Food, Agriculture, and World War II,* and *Miscellaneous Publications*; and in articles in professional journals. The following series are now discontinued: *Wheat Studies* (1924–44), *Grain Economics Series* (1932–45), *Fats and Oils Studies* (1928–40), *War-Peace Pamphlets* (1942–51), and *Commodity Policy Studies* (1943–49).

ADVANCED DEGREES

Admission to Program.—For admission to the program of graduate study in the Institute, the student must present evidence of high ability and appropriate undergraduate training. Well-prepared students should be able to complete the program for the degree of Master of Arts within one year, and for the degree of Doctor of Philosophy within three to four years.

Residence Requirement.—The University requires of the candidate for the degree of Master of Arts a minimum of one year (three quarters) spent as a registered student at Stanford University (see *Information Bulletin*). The candidate for the degree of Doctor of Philosophy must complete a minimum of three years (nine quarters) of graduate study, of which one year must be spent as a registered student at Stanford University. The Institute requires of its candidates for the doctoral degree that two years must be spent in the program of the Institute.

Degree of Master of Arts.—To be recommended to the Committee on Graduate Study for the degree of Master of Arts, the student must have completed satisfactorily a program of graduate study approved in advance by the Institute's Committee on Instruction, and amounting to not less than 45 units of credit. In order to demonstrate the candidate's competence in empirical research, the course of study includes the writing of a graduate research paper. The candidate is required to participate in weekly staff discussions. An average grade of B or better must be attained in the entire program of study.

Degree of Doctor of Philosophy.—The Institute's program leading to recommendation for the degree of Doctor of Philosophy gives an important place to theoretical economic analysis, but it emphasizes empirical investigation of economic aspects of food and agriculture, focusing upon primary commodities. The program of study is designed to prepare the student for a career of research such as may be found in various branches of the United States Government, particularly in the Department of Agriculture, in agencies of the United Nations, notably the FAO, in specialized research departments in agricultural and food industries, and in universities.

The Food Research Institute recommends candidates to the Committee on Graduate Study for the degree of Doctor of Philosophy when they have satisfied the following requirements:

1. Completion of a dissertation, prepared with a view to early publication, acceptable to the faculty of the Institute and to the University Committee on Graduate Study. The subject of the dissertation should be chosen within the first year of the candidate's work.
2. Demonstration of scholarly proficiency in Institute examinations and in an examination administered by the University Committee on Graduate Study. Such examinations will cover the dissertation subject and four fields of study, ordinarily from the following list: General Commodity Analysis (required of all doctoral candidates); Economics of Agriculture; Agricultural Geography; Agricultural Policy and Regulation; Speculative Prices; Statistical Research; Economics of Food Consumption; Economics of Tropical Agriculture; Agricultural History and Land Policy; and International Commodity Trade and Policy. Other fields may be offered by arrangement with the Committee on Instruction.
3. Either a minor in Statistics or Economics, or courses outside the Food Research Institute so chosen as to supplement the candidate's work on his dissertation and on the Institute's fields listed above.
4. Demonstration of such degree of competence in statistics as is afforded by at least two courses of instruction beyond an elementary level.
5. Participation in weekly staff discussions.
6. Reading knowledge ordinarily of two approved languages other than English. Proficiency in the languages is established by examiners appointed by the University Committee on Graduate Study.

The Institute does not offer a formal program appropriate for a minor for the degree of Doctor of Philosophy.

COURSES OF INSTRUCTION

Courses numbered 100–199 are open to graduate and well-qualified Upper Division students. Courses numbered 200 and above are primarily for graduate students. Enrollment in all courses requires prior consultation with the instructor.

101. The World's Food.—Lectures and discussions, chiefly on aspects of consumption.
4 units, autumn quarter (JOHNSTON) MTWTh 10

120. American Agricultural Policy.—The economic background of American agricultural policy; principal arguments of proponents of farm relief; price parity and income parity; analysis of legislation and implementation.
3 units, winter quarter (JONES) MTTh 1

130. Economics of Agriculture.—Economic principles dominating agricultural production; theories of economic location and intensity of land utilization. Economic problems involved in land tenure, farm labor and wages, insurance, co-operation, farm finance, land rent and land value, freight-rate structure of common carriers, farm taxes, standards and grades, tariff protection. Five obligatory field trips to diversified and specialized farms and ranches.

5 units, spring quarter (Brandt) MW 4–6

140. International Trade in Agricultural Commodities.—World trade patterns; commodity economics and prices; impact on exporting regions; national marketing controls and international commodity arrangements.

3 units, winter quarter (Swerling) MTTh 2

200. Critique of Statistical Series.—Bibliography, tabulation, and graphical presentation.

3 units, spring quarter (Peirce, King) By arrangement

201. Seminar: Food Consumption Problems.

3 units, winter quarter (Farnsworth) By arrangement

210. Agriculture in Tropical Economies.

3 units, autumn quarter (Wickizer) By arrangement

211. Food Problems of India.

3 units, winter quarter (Bhattacharjee) By arrangement

212. African Agricultural Development.

3 units, spring quarter (Neumark) By arrangement

215. Seminar: Problems of Tropical Agriculture.

3 units, autumn quarter (Wickizer) By arrangement

220. Seminar: American Agricultural Policy.

3 units, winter quarter (Jones) By arrangement

221. Seminar: Principles of Agricultural Policy.

3 units, spring quarter (Brandt) [Not given in 1954–55]

225. Agricultural Expansion in North America.—Factors influencing the course and rate of pastoral and agricultural expansion in the United States and Canada.

3 units, autumn quarter (Peffer) By arrangement
[In alternate years: given in 1954–55]

226. Agricultural Expansion in Latin America.—Factors influencing the course and rate of pastoral and agricultural expansion in selected Latin American countries.

3 units, autumn quarter (Peffer) [In alternate years; not given in 1954–55]

231. Distribution of World Crops and Livestock.

3 units, autumn quarter (Bennett) By arrangement

232. Commodities Produced in Agriculture.—Essential biological, industrial, and economic characteristics of agricultural commodities, and specific problems involved in their production, transportation, storage, processing, and utilization; their significance in national economies and international relations; comparative evaluation of the role of these commodities in the modern industrial economy. Five obligatory field trips to processing plants and marketing agencies in the Bay Area will be conducted.

5 units, spring quarter (Brandt) TTh 4–6

235. Economics of Futures Trading.—Organization of speculative commodity markets; price characteristics; economic merits and demerits; attempts at regulation; the alternative of government price control.

3 units, spring quarter (Working) MWF 11

236. Seminar: Speculative Prices.

3 units, autumn quarter (Working) By arrangement

240. Seminar: International Trade in Agricultural Commodities.

3 units, winter quarter (Swerling) By arrangement

250. General Commodity Analysis I.
5 units, winter quarter (FARNSWORTH) By arrangement

251. General Commodity Analysis II.
5 units, spring quarter (FARNSWORTH) By arrangement

325. Readings in Agricultural History.
3 units, autumn quarter (PEFFER) By arrangement

330. Readings in Economics of Agriculture.
3 units, spring quarter (BRANDT) By arrangement

331. Readings in Agricultural Geography.
Autumn quarter (BENNETT) By arrangement

400. Advanced Directed Reading and Research.—Advanced individual work leading to final preparation in the fields of study listed above, or to theses and to dissertations.
Any quarter (INSTITUTE FACULTY) By arrangement

GRADUATE DIVISION SPECIAL PROGRAMS

ERNEST R. HILGARD, Dean of the Graduate Division

The Graduate Division Special Programs make provision for students whose plans for study toward the Ph.D. degree do not fall within the province of any one department. Such programs are individually planned for unusually well-qualified students.

A graduate student with a well-considered program not now provided for in the existing departments or special programs of the University may approach a professor qualified to give him guidance. The professor, if he believes the program desirable, will gather a special committee consisting of at least three other members of the Academic Council who represent the student's various fields of interest. Before the student embarks on the program, this committee will address a Declaration of Intention (Form G54) to the University Committee on Graduate Study:

1) Defining the area of the special program, showing that the University is qualified to offer it, and proposing a title for the degree.

2) Outlining the program of study and research contemplated.

3) Indicating, if possible, the nature of the dissertation contemplated.

If this Declaration is approved by the University Committee on Graduate Study, the special committee will supervise the candidate's work and sign the forms ordinarily transmitted by major departments. The chairman of the special committee will normally direct the dissertation.

GRADUATE DIVISION SPECIAL COURSES

[For graduate students in all departments.]

As part of breadth of training at the graduate level, the following special courses are provided. There are no specific prerequisites for any of these courses.

301. Introduction to the History of Science I.
3 units (KOENIG) [Not given in 1954–55]

302. Introduction to the History of Science II.
3 units (KOENIG) [Not given in 1954–55]

303. Science and Human Affairs.—The basic ideas of twentieth century physics are presented in an elementary way with emphasis on the effects that these ideas may have on philosophical and social questions. The course involves discussion of these topics with considerable student participation. Enrollment limited to 15.
3 units, winter quarter (ALVAREZ-TOSTADO) MWF 11

305. Introduction to Contemporary American Life.—Orientation to the organization and practices of the American university and community through lectures, the study of selected literature, field trips, interviews, and discussions. Primarily for the new graduate students from abroad, but open to undergraduate students from abroad with the consent of the instructor.
2 units, autumn quarter (WARMBRUNN) MWF 3

308. Introduction to American Higher Education.—A course for those planning careers in teaching, research, or administration in American higher

education. The course explores European and American historical backgrounds to the end of comprehending the current scene and planning for the future.
4 units, autumn and *spring quarters (COWLEY) TTh 2–4

310. The Philosophy of Language.—An introduction to the study of the nature and uses of symbols. Such concepts as those of meaning, syntax, ambiguity, vagueness, and definition are examined. Among the topics discussed are: the place of semantics in the study of language; the criteria for the selection of a language-system; the differences and relations between the scientific, poetic, and philosophic use of language. This course does not presuppose training in philosophy.
3 units, spring quarter (DAVIDSON) MWF 1

311. Masterpieces of Greek Literature in English.—Assignments will include some outstanding examples from each of the various genres: epic, lyric poetry, drama, historical and philosophical writings, literary criticism, the short story, the novel, and satire. In general, only complete works will be read.
3 units, winter quarter (———) By arrangement

312. Contemporary Literature in its Major Themes.—Reading and discussion of contemporary works of literary and cultural significance. By permission of the instructor, this course may be repeated for credit.
3 units, spring quarter (LINSALATA, WEINSTEIN, WOLPE) MWF 11

313. The Nature of Music.—Illustration and discussion of the possibilities and values in musical expression.
3 units, winter quarter (CROSTEN) By arrangement

323. The Nature of American Society.—An analysis in terms of sociological concepts and methods of American society, its distinctive character and its major problems.
3 units, spring quarter (LA PIERE) MTW 9

324. The Nature of Culture.
3 units (KEESING) [Not given in 1954–55]

325. Economics and the Social Sciences.—Designed for graduate students in fields other than economics, this course will survey the subject matter of economics and explore the relationship to other branches of the social sciences.
3 units, autumn quarter (BARAN) MWF 3

327. Psychology of Problem-Solving and Thinking.
3 units (TAYLOR) [Not given in 1954–55]

328. Geography and Contemporary World Problems.—The effects of the physical pattern of nations on modern economic and political development.
3 units, spring quarter (GEOGRAPHY STAFF) MWF 9

[See also the courses offered by the Hoover Institute. A number of departments offer graduate courses open to the non-specialist, e.g., English 270, Contemporary American Fiction; English 303, Tragedy.]

COURSES FOR PH.D. CANDIDATES IN GRADUATE DIVISION SPECIAL PROGRAMS

400. Research.
By arrangement

401. Ph.D. Dissertation.
By arrangement

HOOVER INSTITUTE AND LIBRARY ON WAR, REVOLUTION, AND PEACE

NINA ALMOND, Librarian and Consultant in Research, Emeritus

PERRIN C. GALPIN, ALLAN HOOVER, HERBERT HOOVER, RALPH H. LUTZ, JEREMIAH MILBANK, J. E. WALLACE STERLING, ROBERT E. SWAIN, FRED WICKETT, Advisory Board
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RICHARD ADLOFF, VIRGINIA THOMPSON ADLOFF, ELEANOR BISBEE, XENIA J. EUDIN, OLGA H. GANKIN, GEORGE H. KERR, ROBERT C. NORTH, ANTHONY E. SOKOL, HOBART N. YOUNG, Research Associates
JACQUES VAN DER BELEN (Belgium and the Netherlands), RONE AMORIM (Brazil), VIDYA P. DUTT (India), JOSÉ VASCONCELOS (Mexico), FILIP GIL (Uruguay), Special Representatives outside the United States

The Hoover Library on War, Revolution, and Peace was founded by Herbert Hoover during World War I. The collection of materials begun at that time has been continued. These materials, as the name of the Library indicates, deal with the causes and conduct of the first and second world wars, the revolutionary movements of the twentieth century, the peace settlements following the two world wars, and international relations of all countries, particularly since 1914.

The materials on peace aims, peace plans, and peace movements, military government, international organization and administration, and on propaganda and public opinion are abundant. The collections on the Communist, Socialist, Fascist, and National Socialist movements and their variants include the contributions of many governments and of a great number of individuals and political associations. The collections on Africa, the Far East, and the Pacific Area are being expanded, especially in relation to colonies and colonial questions.

The Library's collections include government documents, files of newspapers and serials, manuscript memoirs, diaries and personal papers of men and women important in world affairs, publications of ephemeral societies, publications and records of national and international bodies, both official and unofficial, and books and pamphlets.

The organization has dual functions, as its name indicates. The preservation and organization for use of the records it collects on war, revolution, and peace in the twentieth century is the function of the Library. The function of the Institute is to carry on research and instruction in problems related to the major fields of Library interest, to publish the results of such research, and thus to increase knowledge and deepen understanding of the issues that face our nation and the world in these times.

The use of the unrestricted materials is open to advanced undergraduates, graduate students, and faculty of Stanford University; to faculty and graduate students from other universities and colleges; and to other qualified investigators.

The Hoover Institute and Library offers a number of seminars and several departments offer courses using the Library's materials. Members of the faculty of the University engaged in active academic work in the social sciences and the humanities are also directing research work in the Hoover Library in those fields in which they are concerned.

INSTRUCTIONAL PROGRAM

115. Social Forces and International Organization.—Analysis of the development and current activities of selected major international organizations with special reference to the influence exerted upon them by world political and social forces and their reciprocal effect upon these forces. Upper Division and graduate students, by permission. Prerequisites: Any two of the following—Political Science 133, 147; History 104, 115, 128, or equivalents.
5 units, autumn quarter (ROTHWELL, BOENINGER)

121. Problems of National and Collective Security.—Analysis of security problems confronting the United States and of postwar arrangements to meet these problems on a national or collective basis. Prerequisites: History 104, 231, or Political Science 133, or equivalents. Upper Division and graduate students, by permission.
5 units, winter quarter (ROTHWELL, SOKOL)

141. Eastern Europe since 1945.—An analysis of the events in the "Soviet sphere" since the collapse of Nazi domination; the patterns of communist conquest and domination of the area; comparative study of the most important political, social, and economic problems of the area. Upper Division and graduate students, by permission.
5 units, winter quarter (SWORAKOWSKI)

150. The Communist Movement and World Politics.—Investigation and analysis of the origins and development of the international communist movement, its policies, strategy, and tactics, and methods of opposing it. Seniors and graduate students, by permission.
5 units, winter and spring quarters (FISHER)

181. The Emergence of a Modern State in China.—The focus of the seminar will be on the historical development of selected political, social, and economic institutions in China since approximately 1800. The primary emphasis will be upon internal developments in the country. Upper Division and graduate students by permission.
5 units, winter quarter (M. Wright)

220. Problems of Sea Power.—A study of the nature, composition, and history of sea power. Graduate students. Seminar limited to 10.
5 units, spring quarter (SOKOL)

231. The German Expellee Problem.—A study of population shifts in Central Europe after World War II and their relation to the political, social, and economic developments in present-day Germany. The relation of the refugee problem to regional and international organizations in the postwar era. Reading of German newspapers published by expellee groups, documents issued by Federal Ministry for Expellee Affairs, and publications of various organizations in Western Germany concerned with this problem. Upper Division and graduate students, by permission.
5 units, spring quarter (BOENINGER)

253. Nationality Problems in Russia after 1900.—A general survey of the importance of nationality problems during the periods of the Tsarist regime, the Provisional Government, and the Bolshevik rule in Russia. The non-Russian and nationally mixed areas as an asset and weakness of Russia. Russification and national separations. The theory and practice of Soviet nationality policy. Because of the vastness of the areas and numerical strength of the national groups concerned, a different region will be treated as a case study in each quarter, i.e., Caucasus, Baltic area, and others. Upper Division and graduate students by permission. Because most of the materials available are in foreign languages, a knowledge of one of several languages (Russian, French, German) recommended for admission.
5 units, fall quarter (SWORAKOWSKI)

273. Problems of Nationalism and Reform in the Arab World.—A study of the cultural, economic, and political bases of the nationalist movements in the Arab world. Graduate students, by permission.
5 units, fall quarter (C. P. HARRIS)

274. Contemporary Egypt: Nationalism, Islam, and Modernism in Egypt (1882–1953).—Case study of the growth of nationalism in an Arab-Islamic society, and the interplay of the forces of conservatism and modernism.
5 units, winter quarter (C. P. HARRIS)

281. Revolution and Reform in China.—The seminar will deal with changes, particularly in values and ideologies, produced in China through foreign influences. The seminar would seek to relate internal developments to the Western and Soviet impact on China. Prerequisites: two or more courses in Far Eastern history, diplomatic relations, or government and politics. Upper Division and graduate students, by permission.
5 units, spring quarter (M. WRIGHT)

299. Directed Reading and/or Special Research in Hoover Library Fields.—Advanced individual work by arrangement on subjects not listed for the current year.
Any quarter (STAFF)

HUMANITIES AND SCIENCES

——— (Dean), Ray Nelson Faulkner (Associate Dean), Thomas A. Bailey, Albert H. Bowker, Chilton Rowlette Bush, William Loran Crosten, John Wendell Dodds, John D. Goheen, Philip W. Harsh, Hubert Crouse Heffner, Felix Maxwell Keesing, George S. Parks, Leonard I. Schiff, Robert R. Sears, Kenneth Arrow, Anthony E. Sokol, Friedrich Wilhelm Strothmann, Menahem M. Schiffer, Victor C. Twitty, James T. Watkins, Virgil K. Whitaker, Joseph E. Williams, *Executive Committee*

ORGANIZATION

The faculty of Humanities and Sciences includes all members with the rank of instructor or above of the Departments of Art and Architecture, Asiatic and Slavic Studies, Biological Sciences, Chemistry, Classics, Economics, English, Geography, Germanic and Romanic Languages, History, Mathematics, Music, Philosophy, Physics, Political Science, Psychology, Sociology and Anthropology, Speech and Drama, and Statistics, and the Institute for Journalistic Studies, together with appointees to the Faculty at Large.

Members of the faculty of Humanities and Sciences are listed under their respective departments, or under the staff for Special Interdepartmental Programs.

UNDERGRADUATE PROGRAMS

A student wishing to take a departmental major leading to the degree of Bachelor of Arts should consult appropriate sections of the announcements following. Further information concerning requirements may be obtained from the department.

A student desiring to fulfill the requirements for the degree of Bachelor of Arts or Bachelor of Science in one of the special interdepartmental programs (see Humanities Special Programs, Physical Sciences General Program, and Social Sciences Special Programs in following sections of this bulletin) should consult the Director of Special Programs in the Humanities, the Chairman of the General Program in the Physical Sciences, or the chairmen of interdepartmental programs in the Social Sciences. For general statements of the requirements for the degree of Bachelor of Arts or Bachelor of Science in these programs, students should see appropriate sections of the announcements following.

ROTC.—Reserve Officers' Training Corps are maintained at Stanford by the Army, the Navy, and the Air Force (see Air, Military, and Naval Science and Tactics in this Bulletin). Students enrolled in chemical engineering, chemistry, or physics who are also enrolled in an ROTC program will usually require more than the usual four years (twelve quarters) in the University to obtain a baccalaureate degree.

These Air, Military, and Naval Science courses require 36 units of credit in addition to the chemical engineering, chemistry, or physics course requirements, and the additional time required will vary from one to three quarters depending upon the circumstances in each case.

GRADUATE PROGRAMS

Candidates for the degree of Master of Arts, Master of Science, or Doctor of Philosophy should consult appropriate sections of the announcements following and see an adviser of the department in which they intend to specialize for information concerning requirements for these degrees.

Programs of study have also been established in the interdepartmental program in International Relations under the direction of the committee on this program. Information regarding enrollment for the degree of Master of Arts in International Relations will be found on pages 270–273 of this bulletin.

ART AND ARCHITECTURE

Ray Nelson Faulkner, Edward McNeil Farmer, Daniel Marcus Mendelowitz, Professors
Victor King Thompson, Associate Professor
Victor Mikhail Arnautoff, Matthew Kahn, Assistant Professors
M. Louise Haskin, Acting Assistant Professor
Raymond E. Brose, John-David Paul LaPlante, Instructors
John C. Worsley, Acting Instructor
Birge M. Clark, Dwight Coddington, Albert Henry Hill, Ernest J. Kump, Jaroslav J. Polivka, Eldridge T. Spencer, Lecturers in Architecture

The art program is presented in three areas: the courses of instruction; the Art Gallery exhibits; and the Museum with its collection and opportunities for research work.

The lecture and laboratory courses are open to the general student and afford a means of increasing his appreciation of art and an opportunity to try out his abilities.

UNDERGRADUATE WORK

Lower Division.—The Lower Division student intending to major in art will confer with the art adviser at the beginning of each quarter to plan his course of study. Prospective art major students should plan to complete about 20 units of art work while in the Lower Division.

Requirements for the Degree of Bachelor of Arts

Three undergraduate curricula leading to the Bachelor of Arts degree, described below, are open to the student majoring in art and architecture. Completion of one of the three curricula with an average grade of not less than B minus is prerequisite to recommendation for graduate or professional work.

1. The *Painting Curriculum* provides basic art courses with emphasis on drawing and painting for students whose interests and abilities lie in the field of pictorial art. Required courses:

Painting: Art 1*a*, 1*b*, 2, 102, 103, 106, 107, 110	30 units
Design: Art 24, 26, 124	9 units
Art History: Art 60, 61, 62, 166	17 units
Art Elective	14 units
Total	70 units

2. The *Design Curriculum* provides basic art courses with emphasis on design for students whose interests and abilities lie in that field. Required courses:

Design: Art 24, 26, 124, 125, 127, 129, 137	31 units
Painting: Art 1*a*, 1*b*, 2, 103 or 106	12 units
Art History: Art 60, 61, 62, 63, 166	19 units
Art elective	8 units
Total	70 units

3. The *Pre-Architectural Curriculum* provides basic training in architecture and art and the opportunity for a broad liberal education prior to specialization. Required courses are:

Art and Architecture requirements:

Architecture: 41, 42, 43, 51, 52, 53, 141, 142, 143, 146, 147, 149, 150, 150*a*, 151, 152, 153	60 units
Art: 1*a*, 24, 61, 65, and 14 units art elective	16 units
Other: Math. 10, EE108*a*	6 units
Total	82 units

Apprenticeship: Three-month experience with a registered architect or any one of the building trades.

Special Major Program for Honors Candidates in Humanities.—Students who are planning to take the special Honors Program in Humanities may fulfill the requirements for their major in art by satisfactorily completing the following courses: Art 1*a*, 1*b*, 2, 24, 26, 61, 62, 102, 103, 106, 124, and 166.

If the major field of emphasis is *Architecture* satisfactory completion of the following courses is required:

Architecture 25 units	
Introduction to Architecture 41, 42, 43	6 units
Building Types I, II, III	9 units
Interior Design 146	5 units
Landscape Design 147	5 units
Painting 1*a*, 1*b*	6 units
Design 6 units	
Elementary Design 24	3 units
Color 26	3 units
History and Theory: Modern Architecture 65	5 units
Art Electives: History of Architecture 61	5 units
	47 units

(See pages 209–211 for a description of the Honors Program.)

GRADUATE PROGRAM

Graduate work leading to the Master's degree may be undertaken by students who wish to engage in advanced creative work, art education, or architecture. Only such students will be accepted whose ability is evident and whose study will lie within the fields in which the members of the faculty are working.

No degree is offered beyond the Master's degree, but work for a minor in art will be provided for properly qualified students when such work forms an essential part of the student's requirement for an advanced degree in another department.

Degree of Master of Arts

A. Admission to candidacy for the degree of Master of Arts with specialization in creative work is based on:
   1. The equivalent of a Bachelor of Arts degree in art at this University.
   2. A grade-point average of B in at least 70 units of undergraduate work in art.
   3. Formal admission to candidacy is granted by the University Committee on Graduate Study.

The requirements for the degree of Master of Arts in creative work are:

1. Completion of a minimum of three full quarters of graduate work in residence at this University.
2. Completion of the equivalent of 45 units of selected Upper Division and graduate courses. At least 30 units of this work must be in art with a grade of B or above and distributed as follows:
   - *a*) 8 units of drawing and painting
   - *b*) 8 units of design
   - *c*) 8 units of history and theory
   - *d*) 6 units of thesis *or* individual creative project accompanied by written report.
3. Periodic evaluation of creative work.

B. The requirements for admission to candidacy for the degree of Master of Arts with specialization in architecture are:

1. A Bachelor of Arts degree in architecture from this University, or its equivalent.
2. A grade-point average of B in at least 30 units of undergraduate work in art and architecture.
3. Formal admission to candidacy is granted by the University Committee on Graduate Study.

The requirements for the professional degree of Master of Arts in architecture are as follows:

1. Completion of a minimum of three full quarters of graduate work in residence at this University.
2. Completion of 45 units of Upper Division and graduate courses unless advanced standing is granted. Required courses are:

Architecture: 240, 241, 242, 248, 301	35 units
Other: Law 101, Architecture History elective	10 units
Total	45 units

TEACHING CREDENTIALS

Requirements for the General Secondary School Credential are: one graduate year at this University of not less than 39 units of Upper Division and graduate courses, including at least 9 units of work in each of the candidate's teaching fields and at least 9 units in education; completion of the teaching-major in art and of a teaching-major or -minor in at least one other subject. (For further information consult pages 32–33 and the credential secretary of the School of Education.)

COURSES OF INSTRUCTION

Elementary courses of both lecture and laboratory type are numbered below 100. No elementary course may be repeated for credit. Advanced courses are numbered 100 or above and, with the approval of the instructor, may be repeated indefinitely for credit.

Courses in Drawing and Painting

1a. Elementary Drawing.—Study in black and white to gain facility in objective representation. Laboratory.

3 units, autumn, *winter, and *spring quarters (Staff)

1b. Elementary Composition.—Problems in pictorial organization in various media. Laboratory.
2 units, spring quarter (LAPLANTE)

2. Elementary Life Drawing.—Drawing with various dry media from life. Study of the action and construction of the human figure. Prerequisite: Art 1*a*. Laboratory.
2 units, autumn and winter quarters (LAPLANTE, BROSE)

100. Individual Work: Drawing and Painting.—With the instructor's permission a qualified student may undertake individual work with weekly criticisms. Prerequisite: a previously completed regular course from that faculty member.
Any quarter (STAFF) By arrangement

102. Advanced Life Drawing.—Prerequisite: Art 2. Laboratory.
2 units, autumn and winter quarters (LAPLANTE, BROSE)

103. Water-Color Painting.—Landscape painting. Prerequisites: Art 1*a*, 1*b*, and 26. Laboratory.
3 units, autumn and *spring quarters (MENDELOWITZ AND STAFF)

106. Oil Painting.—Life, still life, landscape, composition in oil and related media. Prerequisites: Art 1*a*, 1*b*, 2, and 26. Laboratory.
3 or more units, autumn and *winter quarters (ARNAUTOFF, BROSE)

107. Painting Techniques.—The composition and use of artists' materials. Lectures, reading and laboratory experiments.
3 or more units, winter quarter (ARNAUTOFF)

108. Sculpture.—Problems in modeling and carving in various materials.
2 or more units, spring quarter (KAHN)

110. Print Processes.—Technique of linoleum cutting, wood engraving, and lithography applied to pictorial expression. Prerequisite: Art 2. Laboratory.
3 to 5 units, winter and *spring quarters (ARNAUTOFF)

206. Advanced Oil Painting.—Prerequisite: Art 106.
3 or more units, spring quarter (STAFF)

COURSES IN DESIGN

22. Lettering.—Theory of design and practical exercises in lettering in various media. Laboratory.
3 units, winter quarter (BROSE)

24. Elementary Design.—Laboratory problems emphasizing work with the art elements.
3 units, autumn, *winter, and *spring quarters (KAHN)

26. Color.—Theory and practical problems to develop a knowledge of the visual characteristics of color.
3 units, winter and *spring quarters (BROSE)

121. Craft Techniques.—Introduction to ceramics, work in metal, wood, leather, and other popular craft materials.
3 units, winter quarter (HASKIN)

123. Individual Work: Design.—With the instructor's permission a qualified student may undertake individual work with weekly criticisms. Prerequisite: a previously completed regular course from that faculty member.
Any quarter (KAHN) T 7:30–10 P.M.

124. Intermediate Design.—Abstract and practical design problems. Familiarization with materials and workshop methods. Prerequisites: Art 1*a*, 1*b*, 24, 26.
3 to 6 units, autumn and *winter quarters (KAHN)

125. Advanced Design.—Varied comprehensive problems in design. Prerequisite: Art 124.
4 units, spring quarter (KAHN)

127. Commercial Art.—Design in advertising and illustration including work in silk screen reproduction, packaging and display. Prerequisites: Art 22, 125.
3 or more units, spring quarter (BROSE)

129. Textile Design.—Problems in textile design with emphasis on printed cloth. Work in silk screen process. Prerequisite: Art 125.
5 units, winter quarter (KAHN)

137. Product Design.—Designing furniture and other articles for craft and industrial production. Prerequisite: Art 125.
3 units, autumn quarter (KAHN)

[**The Theory of Costume.**—See Speech and Drama 71.]

[**The Technique of Costume.**—See Speech and Drama 72.]

[**History of Costume.**—See Speech and Drama 171.]

[**Introductory Costume Design.**—See Speech and Drama 172.]

[**Techniques of Stage Design.**—See Speech and Drama 178.]

[**Projects in Stage Costume.**—See Speech and Drama 272.]

COURSES IN ART HISTORY AND THEORY

60. Introduction to Art.—Orientation to contemporary and historic art forms and principles to increase understanding and enjoyment of art. Illustrated lectures.
2 units, winter quarter (FAULKNER)

61. History of Architecture.—Survey of architecture from ancient times to mid-nineteenth century. Illustrated lectures.
5 units, winter quarter (FARMER)

62. History of Painting.—A survey of European and American painting from the Renaissance through the nineteenth century. Illustrated lectures.
5 units, autumn quarter (MENDELOWITZ)

63. The Modern House.—Survey of functional, social, and aesthetic problems in house design. Illustrated lectures.
2 units, autumn quarter (FAULKNER)

166. Modern Art.—Architecture, painting, and allied arts from 1850 to 1950. Illustrated lectures. Open to all students.
5 units, spring quarter (FARMER)

168. American Art.—A survey of art in America from Colonial to modern times. Illustrated lectures.
5 units, winter quarter (MENDELOWITZ)

170. Individual Work: Art History.—With the instructor's permission a qualified student may undertake individual work with weekly conferences. Prerequisite: a previously completed regular course from that faculty member.
Any quarter (STAFF) By arrangement

175. Survey of Oriental Art.—Study of the origin of art from earliest times in China, India, and Japan and its chronological development through the major formative periods.
4 or 5 units, autumn quarter (LAPLANTE)

261. Seminar: History of Architecture.
3 or more units, winter quarter (FARMER)

262. Seminar: History of Painting.
3 or more units, spring quarter (MENDELOWITZ)

266. Seminar: Modern Art.
3 or more units, autumn quarter (STAFF)

300. Master's Thesis.
Any quarter (STAFF) By arrangement

301. Master's Project.
Any quarter (STAFF) By arrangement

[**Introduction to Greek Art.**—See Classics A120.]

[**Early Greek Art.**—See Classics A125.]

[**The Arts in Nonliterate Societies.**—See Anthropology 145.]

[**Curriculum and Instruction in Secondary Art.**—See Education 280.]

[**Individual Study in Curriculum and Instruction in Art.**—See Education 480*i*.]

INTERDEPARTMENTAL SEMINAR

[**Senior Seminar in Humanities: The Relationship between the Arts.** —See Humanities 192.]

COURSES IN ARCHITECTURE

41. Introduction to Architecture.—Fundamentals of design, drawing, rendering and organization of simple elements of architecture.
2 units, autumn quarter (THOMPSON)

42. Introduction to Architecture.—Continuation of Architecture 41.
2 units, winter quarter (THOMPSON)

43. Introduction to Architecture.—Continuation of Architecture 42.
2 units, spring quarter (THOMPSON)

51. Building Types I.—Laboratory work, lectures, field trips and readings on the design of the house.
2 units (Lec.), autumn quarter (FAULKNER)
2 units (Lab.), autumn quarter (WORSLEY)

52. Building Types II.—Continuation of Architecture 51.
3 units (Lab.), winter quarter (THOMPSON)

53. Building Types III.—Continuation of Architecture 52.
3 units (Lab.), spring quarter (WORSLEY)

140. Individual Work: Architecture.—With permission of the instructor, any student may develop and solve problems in design, technology, or research. Prerequisite: Architecture 53.
Autumn, *winter, and *spring quarters (STAFF)

141. Building Types IV.—Laboratory, field trips and readings. Solution of architectural problems. Prerequisite: Architecture 53.
141. 3 units (Design Lab.), autumn quarter (THOMPSON)
141a. 2 units (Structure), autumn quarter (WORSLEY)

142. Building Types V.—Continuation of Architecture 141.
142. 3 units (Design Lab.), winter quarter (WORSLEY)
142a. 2 units (Structure), winter quarter (WORSLEY)

143. Building Types VI.—Continuation of Architecture 142.
143. 3 units (Design Lab.), spring quarter (THOMPSON)
143a. 2 units (Structure), spring quarter (WORSLEY)

146. Interior Design.—Laboratory, lectures, field trips and readings. Prerequisite: Architecture 51.
3 to 5 units, spring quarter (KAHN)

147. Landscape Design.—Design of gardens, laboratory work, field trips, lectures and reading. Prerequisite: Architecture 51.
3 to 5 units, winter quarter (FAULKNER)

149. Contemporary Structures.—Lectures and readings.
2 units, spring quarter (POLIVKA)

150. Mechanical Equipment.—Lectures, readings and field trips.
2 units, winter quarter (CODDINGTON)

150a. Mechanical Equipment.
2 units, spring quarter (CODDINGTON)

151. Building Integration I:—The Community.—Laboratory, field trips, readings. Solution of and planning architectural problems arising in the community. Prerequisite: Architecture 143.
151. 4 units (Design Lab.), autumn quarter (THOMPSON)
151a. 2 units (Structure), autumn quarter (WORSLEY)

152. Building Integration II:—The Community.—Continuation of Architecture 151.
152. 4 units (Design Lab.), winter quarter (THOMPSON)
152a. 2 units (Structure), winter quarter (WORSLEY)

153. Building Integration III:—The Community.—Continuation of Architecture 152.
153. 4 units (Design Lab.), spring quarter (THOMPSON)
153a. 2 units (Structure), spring quarter (WORSLEY)

240. Professional Practice.—Lectures, readings, laboratory work in office of co-operating Bay Area architects.
4 units, winter quarter (THOMPSON)

241. Building Integration IV:—The City.—Solution of large scale architectural problems involving regional and urban planning. Prerequisite: Architecture 153.
7 units, autumn quarter (HILL)

242. Building Integration V.—The City.—Continuation of Architecture 241.
7 units, winter quarter (KUMP)

248. Building Materials and Their Specifications.—Lectures, readings and field trips. Prerequisite: Architecture 153.
2 units, autumn quarter (CLARK)

301. Master's Project.—With permission of the instructor.
15 units, spring quarter (SPENCER)

ASIATIC AND SLAVIC STUDIES

ANTHONY E. SOKOL, Professor of Asiatic and Slavic Studies, and Associate Director of Pacific-Asiatic and Russian Program
SHAU WING CHAN, Professor of Chinese
JACK A. POSIN, Associate Professor of Russian
FREDERIC SPIEGELBERG, Assistant Professor of Indian Civilization
RAYMOND K. WATERS, Assistant Professor of Japanese
SARRA KLIACHKO, Instructor in Russian

This department offers work in the languages, literatures, and civilizations of Asia and of Slavic Europe. At present the A.B. degree is granted in Chinese, Japanese, and Russian studies. The main difference between the departmental degree in these languages and the degree granted in the Pacific-Asiatic and Russian Program (see under Humanities) is that the former emphasizes the linguistic preparation of the student by requiring at least three years of the language.

HONORS PROGRAM IN HUMANITIES

An Honors Program in Humanities is offered for majors in this department who wish to supplement their departmental major by a related and carefully guided program of studies. (See pages 209–211 for a description of the Honors Program.)

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

In order to be recommended for the degree of Bachelor of Arts in Chinese, the student must complete in the department a minimum of 36 units beyond the first two years of the language. These units must include the following courses: C81; C91; C101–C103; C161; C191.

In order to be recommended for the degree of Bachelor of Arts in Japanese, the student must complete in the department a minimum of 36 units beyond the first two years of the language. These units must include the following courses: J81; J82; J91; J101–J103; J191.

In order to be recommended for the degree of Bachelor Arts in Russian, the student must complete in the department a minimum of 36 units beyond the first two years of the language. These units must include the following courses: R81; R91; R101–R103; R151 or R153 or R160; R161; R191.

In addition to these 36 units, majors in all languages are strongly urged to take the pertinent courses in the history, geography, anthropology, and politics of the respective countries.

All Lower Division courses in the department are open also to Upper Division students.

I. CHINA

C1. First-Year Modern Chinese.—Grammar, reading, and conversation.
5 units, autumn quarter (CHAN) MTWThF 9

C2. First-Year Modern Chinese (continued).
5 units, winter quarter (CHAN) MTWThF 9

C3. First-Year Modern Chinese (continued).
5 units, spring quarter (CHAN) MTWThF 9

C21. Second-Year Modern Chinese.—Further study in grammar, reading, and conversation; composition and translation.
5 units, autumn quarter (CHAN, ———) MTWThF 1

C22. Second-Year Modern Chinese (continued).
5 units, winter quarter (CHAN, ———) MTWThF 1

C23. Second-Year Modern Chinese (continued).
5 units, spring quarter (CHAN, ———) MTWThF 1

C81. Masterpieces of Chinese Literature in English.—A study and appreciation of selected literary works.
3 units (CHAN) [Not given in 1954–55]

C91. Chinese Civilization.—Discussion of Chinese philosophy, ethics, government, social system, art, literature, music, etc.
3 units, winter quarter (CHAN) MWF 10

C100. Directed Reading in English.—Available for students with special problems. Consent of instructor necessary.
(CHAN) By arrangement

C101. Third-Year Modern Chinese.—Intensive reading in modern Chinese authors.
5 units (CHAN, ———) **By arrangement**

C102. Third-Year Modern Chinese (continued).
5 units (CHAN, ———) **By arrangement**

C103. Third-Year Modern Chinese (continued).
5 units (CHAN, ———) **By arrangement**

C131. Introduction to Classical Chinese.—Grammar and syntax; reading of representative texts; composition. Prerequisite: C23, or equivalent, or by permission of instructor.
5 units (CHAN, ———) **By arrangement**

C132. Introduction to Classical Chinese (continued).
5 units (CHAN, ———) **By arrangement**

C133. Introduction to Classical Chinese (continued).
5 units (CHAN, ———) **By arrangement**

C141. Chinese Philosophical Literature in English.—A study and interpretation of selected works of representative philosophers.
3 units, autumn quarter (CHAN) **MWF 10**

C161. Contemporary China.—A survey of the political, social, economic, and cultural problems. Interested Lower Division students may enroll in the course.
3 units, spring quarter (CHAN) MWF 10

C191. Senior Seminar.
2 units (CHAN) By arrangement

C200. Directed Reading in Chinese.—For advanced students who wish to prepare themselves for specialized research in their major field of interest.
(CHAN)

[**Buddhism.**—See Asiatic and Slavic E162, under India (page 112).]

[**Geography of Asia.**—See Geography 130.]

[See also, Hoover Institute.]

[**Peoples of Asia.**—See Anthropology 152.]

[**History of Civilizations of Eastern Asia.**—See History 113, 114.]

[**Diplomatic History of the Far East.**—See History 115.]

[**Recent History of the Far East.**—See History 128.]

[**China in Modern Times.**—See History 191.]

[**Intellectual History of the Far East.**—See History 192.]

[**Modernization in Japan and China.**—See History 194.]

[**The United States and the Far East.**—See History 196.]

[**China and the Steppe.**—See History 198.]

[**Government and Politics in China.**—See Political Science 125.]

II. INDIA

E81. Great Books of India.—Epics and dramas, ancient and modern.
4 units, winter quarter (SPIEGELBERG) MTWTh 11

E91. Indian Civilization.—Vedic and Brahmanic cultures. Later development under foreign rule. Indian art.
5 units, autumn quarter (SPIEGELBERG) MTWThF 11

E95. Contemporary India and Pakistan.
5 units (SPIEGELBERG) [Not given in 1954–55]

E100. Directed Reading.—Indian topics in the field of the student's interest.
(SPIEGELBERG) By arrangement

E161. Bhagavadgita.—Study of this central text of Indian philosophy in translation. Open to Lower Division students.
4 units, spring quarter (SPIEGELBERG) TTh 2–4

E162. Buddhism.—The Buddha, his life and background; his sermons and educational methods. The meaning of Nirvana. The Pali Canon. Theravada and Mahayana. Development of Buddhism in Tibet and in the Far East. Open to Lower Division students.
4 units, autumn quarter (SPIEGELBERG) TTh 2–4

E163. Indian Philosophy.—Open to Lower Division students.
4 units, winter quarter (SPIEGELBERG) TTh 2–4

E164. Religion and Philosophy of India.—Open to Lower Division students.
5 units (SPIEGELBERG) [Not given in 1954–55]

[**Geography of Asia.**—See Geography 130.]

[**The British Empire.**—See History 107.]

[**The British Empire.**—See Political Science 122.]

[**History of India.**—See History 195.]

[**Comparative Religion.**—See Special Programs, R100.]

III. JAPAN

J1. Elementary Japanese.—Grammar, reading, conversation.

5 units, autumn quarter (Waters) MTWThF 9

J2. Elementary Japanese (continued).

5 units, winter quarter (Waters) MTWThF 9

J3. Elementary Japanese (continued).

5 units, spring quarter (Waters) MTWThF 9

J21. Second-Year Japanese.—Readings in modern Japanese.

3 units, autumn quarter (Waters) MWF 1

J22. Second-Year Japanese (continued).

3 units, winter quarter (Waters) MWF 1

J23. Second-Year Japanese.—Introduction to classical Japanese.

3 units, spring quarter (Waters) MWF 1

J81. Masterpieces of Japanese Literature.—A study and appreciation of selected literary works in translation.

5 units (Waters)

J82. Contemporary Japanese Literature.—A survey of Japanese literature since 1868. No knowledge of the Japanese language is required.

3 units (Waters)

J91. Japanese Civilization.—Discussion of Japanese philosophy, ethics, government, social system, art, literature, music, etc.

5 units (Waters)

J100. Directed Reading in English.—Consent of instructor necessary.

(Waters) By arrangement

J101. Third-Year Japanese.—Intensive readings selected to meet the needs of the student.

3 units, autumn quarter (Waters) [Not given in 1954–55]

J102. Third-Year Japanese (continued).

3 units, winter quarter (Waters) [Not given in 1954–55]

J103. Third-Year Japanese (continued).

3 units, spring quarter (Waters) [Not given in 1954–55]

J191. Senior Seminar.

2 units (Waters) By arrangement

J200. Directed Reading in Japanese.—For advanced students who wish to prepare themselves for specialized research in their major field of interest.

(Waters) By arrangement

[**Buddhism.**—See Asiatic and Slavic E162, under India (page 112).]

[**Geography of Asia.**—See Geography 130.]

[**Peoples of Asia.**—See Anthropology 152.]

[**Japan in Modern Times.**—See History 193.]

[**Modernization in Japan and China.**—See History 194.]

[**Government and Politics in Japan.**—See Political Science 124.]

[See also, Hoover Institute.]

IV. SOUTHEAST ASIA AND THE PACIFIC

A151. Problems of Security in the Far East.—A survey of political, social, economic, and military factors that influence United States and world security.

3 units, spring quarter (Sokol) MWF 10

P166. Indonesia.—A general survey of that area, its geography, history, culture, and economic and strategic significance.

3 units (Sokol) [Not given in 1954–55]

S197. Southeast Asia.—A general survey of that region, including Burma, Thailand, Indo-China, Malaya, Indonesia, and the Philippines.

3 units (Sokol) [Not given in 1954–55]

[**Problems of Administration in Pacific Dependencies.**—See Anthropology 165.]

[**Peoples of the Pacific.**—See Anthropology 150.]

[**Australia and New Zealand.**—See History 177.]

[**Southeast Asia and the Philippines.**—See History 197.]

[See also, Hoover Institute.]

V. RUSSIA

R1. Elementary Russian. — Grammar, reading, conversation, elementary composition.
5 units, autumn quarter (POSIN, KLIACHKO) MTWThF 9, 1

R2. Elementary Russian (continued).
5 units, winter quarter (POSIN, KLIACHKO) MTWThF 9, 1

R3. Elementary Russian (continued).
5 units, spring quarter (POSIN, KLIACHKO) MTWThF 9, 1

R5. Intensive Russian.—Equivalent to one year's regular elementary instruction. Grammar, reading, writing, conversation. Limited to twelve students.
15 units, summer quarter (———) MTWThF 9–12

R21. Intermediate Russian.—Reading, conversation, composition; review of grammar.
5 units, autumn quarter (KLIACHKO) MTWThF 1

R22. Intermediate Russian (continued).
5 units, winter quarter (KLIACHKO) MTWThF 1

R23. Intermediate Russian (continued).
5 units, spring quarter (KLIACHKO) MTWThF 1

R30. Russian Conversation.—Prerequisite, R23 or current attendance in that class.
1 unit, spring quarter (KLIACHKO) TTh 3

R31. Scientific Russian.—Includes the social, physical, and biological sciences. Prerequisites: completion of second quarter of Intermediate Russian, or equivalent; consent of instructor.
2 to 5 units, spring quarter (POSIN) By arrangement

R81. Russian Literature.—Survey course in English. Background of eighteenth century; central place to be occupied by nineteenth century; includes twentieth century.
5 units, winter quarter (POSIN) MTWThF 11

R91. Russian Civilization.—Survey of geography and history; peoples and social institutions; religion and philosophy; language and literature; music and art.
5 units, autumn quarter (POSIN) MTWThF 11

R100. Directed Reading in English.—Available for students with special problems. Consent of instructor necessary.
(POSIN) By arrangement

R101. Advanced Russian.—Reading and conversation in Russian; advanced composition.
5 units, autumn quarter (KLIACHKO) MTWThF 3

R102. Advanced Russian (continued).
5 units, winter quarter (KLIACHKO) MTWThF 3

R103. Advanced Russian (continued).
5 units, spring quarter (KLIACHKO) MTWThF 3

R121. Translation.—Training in translation from Russian into English. For qualified students only; with instructor's permission.
1 to 3 units (POSIN) By arrangement
[In alternate years; not given in 1954–55]

R151. Leo Tolstoy.—Chief works of fiction.
3 units, spring quarter (POSIN) MWF 2

R153. Fedor Dostoyevsky.
3 units (POSIN) By arrangement
[In alternate years; given in 1954–55]

R160. Russian Drama.
3 units, spring quarter (POSIN) [In alternate years; not given in 1954–55]

R161. Literature of the Soviet Period.
3 units (POSIN) By arrangement
[In alternate years; given in 1954–55]

R191. Senior Seminar.
2 units, spring quarter (POSIN) By arrangement

R200. Directed Reading in Russian.—Consent of instructor necessary.
(POSIN) By arrangement

[**Geography of the Soviet Union.**—See Geography 133.]

[**Peoples of the Soviet Union.**—See Anthropology 153.]

[**Russia.**—See History 112.]

[**Nineteenth-Century Russia.**—See History 181.]

[**Russia since 1917.**—See History 182.]

[**Russia in Asia.**—See History 183.]

[**Government of the Soviet Union.**—See Political Science 126.]

[**Soviet Law and Planning.**—See Political Science 127.]

[See also, Hoover Institute.]

BIOLOGICAL SCIENCES

LEROY ABRAMS, MARY ISABEL MCCRACKEN, GEORGE JAMES PEIRCE, WILLIS HORTON RICH, GILBERT MORGAN SMITH, HARRY BEAL TORREY, Professors Emeriti

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VICTOR CHANDLER TWITTY, LAWRENCE ROGERS BLINKS, ROLF LING BOLIN, JENS CHRISTIAN CLAUSEN (By Courtesy), GRAHAM PHILLIPS DUSHANE, GORDON FLOYD FERRIS, CHARLES STACY FRENCH (By Courtesy), ARTHUR CHARLES GIESE, WILLIAM MCKINLEY HIESEY (By Courtesy), GEORGE SPRAGUE MYERS, CORNELIS BERNARDUS VAN NIEL, JOSEPH FREDERICK OLIPHANT, WILLIAM CAMPBELL STEERE, EDWARD LAWRIE TATUM, DOUGLAS MERRITT WHITAKER, IRA LOREN WIGGINS, Professors

ROBERT MEREDITH PAGE, DAVID COOK REGNERY, Associate Professors

DONALD PUTNAM ABBOTT, RICHARD WILLIAM HOLM, DAVID DEXTER PERKINS, DONALD EUGENE WOHLSCHLAG, Assistant Professors

LAURA GARNJOBST, MAN CHIANG NIU, Research Biologists

WILLIAM AUSTIN CANNON, CHARLES MANNING CHILD, LAURENCE MONROE KLAUBER, JOHN CASSIDY MARR, OSWALD HOPE ROBERTSON, ALLEN COWIE TAFT, Lecturers

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ORGANIZATION

The Department of Biological Sciences comprises the following divisions of teaching and research: (*a*) General and Experimental Biology, (*b*) Natural History, and (*c*) Marine Biology and Oceanography. The laboratories, museums, and libraries of these divisions are housed in Jordan Hall and the Natural History Museum on the campus, and in the Hopkins Marine Station in Pacific Grove on Monterey Bay. They provide excellent facilities and equipment for instruction and research in the various biological fields represented by members of the department. Land, marine, fresh-water, and brine plants and animals are abundant near by in nature at all times of the year.

The department provides: (1) informative courses for the general student, (2) programs of study leading to the degree of Bachelor of Arts, and (3) programs of graduate study and research leading to the degrees of Master of Arts and Doctor of Philosophy.

In addition to broad offerings in pure science, the department provides programs of study leading to specialized professional outlets. Among these are the premedical and teacher's programs, and special programs in entomology and fisheries biology. Additional programs may be arranged by consultation.

BIOLOGICAL LIBRARIES

The working libraries of the department afford access to books and to current numbers and recent volumes of journals representative of the major biological fields. In addition to the Biological Library in Jordan Hall, there are also libraries in the Natural History Museum and in the Hopkins Marine Station. The latter includes an extensive collection of books, journals, and reprints especially on marine biology. In addition to the main University Library, the libraries of the departments of Anatomy, Bacteriology, Chemistry, Physics, and Geology (including Paleontology), as well as the Lane Medical Library in San Francisco, are open to qualified students in the Department of Biological Sciences.

PROGRAMS OF STUDY LEADING TO THE DEGREE OF BACHELOR OF ARTS

Candidates for the Bachelor of Arts degree must complete: (1) a group of specified courses in biology, or their equivalents, with certain options (see below) in keeping with the intended field of specialization; (2) 24 units of cognate studies in the physical sciences; and (3) 12 units of elective courses in biological sciences. Electives may be courses in biological sciences, anatomy, bacteriology, physiology, or any of the following courses in mineral sciences: G114, Elementary Paleontology; G115, Systematic Invertebrate Paleontology I; and G116, Systematic Invertebrate Paleontology II. Courses included under 1 and 3 must be completed with an average grade of not less than C.

Required Courses in Biology:

Biology 20. Introduction to Botany .... 5 units
Biology 21. Introduction to Invertebrate Zoology .... 5 units
Biology 22. Comparative Vertebrate Anatomy .... 5 units
Biology 23. Comparative Vertebrate Embryology .... 5 units

[NOTE: Students taking this course are not required to take Biology 28, 120, 121, or 122.]

Biology 24. Cellular and General Physiology .... 5 units
Biology 25. Genetics .... 4 units
Biology 28. Flowering Plants; *or* Biology 120, Morphology of Algae and Fungi; *or* 121, Morphology of Mosses and Ferns; *or* 122, Morphology of the Seed Plants..................4–5 units

[NOTE: Students taking one of these courses are not required to take Biology 23.]

[Biology 1, 2, 3 (General Biology) may be substituted for Biology 20 and 21 (transfer from one sequence to another is not encouraged; students enrolling in Biology 1 will ordinarily complete Biology 2 and 3, and those electing Biology 20 will continue with Biology 21); Biology 111h or 112h (Marine Zoology) for 21; Biology 160h (Cellular Physiology) or 167h (Comparative Physiology) for 24.]

Required Cognate Courses in the Physical Sciences:

Chemistry 1, 2, 3, or equivalent	14 units
Organic Chemistry 121, 123, or equivalent	6 units
Physics, Geology, or Mathematics	4 units

In all cases the program of study must be approved each quarter by the departmental Adviser for Graduation. The degree is conferred only upon recommendation of the department. A student transferring from another institution should file a statement of credits promptly with the Adviser for Graduation. These credits will be evaluated and the student will be advised in regard to his remaining program.

Students wishing additional training in any of the special fields of botany or zoology in anticipation of attaining professional competence should consult with advisers of the department regarding the elective units in their programs and additional courses which should be taken. (For botany, see Professor R. M. Page.)

Entomology.—Students expecting to become professional entomologists should plan to secure the doctorate. In their undergraduate program they should elect Biology 114 (Classification of Insects), 116 (Insect Morphology), 184 (Principles of Systematic Biology), and if possible should register for at least one quarter in 118 (Special Problems in Entomology). In addition, they should elect as many units as possible in Plant Biology, including Biology 28 (Flowering Plants), 43 (Forest Botany), and 165 (Plant Physiology). (Consult Professor Ferris.)

Fishery Biology.—Students who intend to become professional fishery biologists should plan to obtain the degree of Master of Arts and, if possible, the degree of Doctor of Philosophy. In planning programs of course work in the field of biology and in other fields allied to their research interests, they should consult members of the Fishery Advisory Committee (Bolin, Marr, Myers, Wohlschlag).

SENIOR HONORS PROGRAM

(See Biology 200 under Courses of Instruction.) This program is open to students of superior scholarship (grade average of 2.5 or better) or of outstanding interest and ability in Biology. The aim of the program is to aid superior students in gaining greater independence of thought and a more professional approach to biological problems, and emphasis will be placed on the importance of original ideas in research rather than on the mastery of established facts. Satisfactory completion of the program will lead to graduation with Honors in Biology.

PREMEDICAL STUDENTS

It is recommended that premedical students take the following courses:

Biology 20. Introduction to Botany	5 units
Biology 21. Introduction to Invertebrate Zoology	5 units
[Biology 1, 2, 3 (General Biology), 9 units, may be substituted for Biology 20 and 21.]	
Biology 22. Comparative Vertebrate Anatomy	5 units
Biology 23. Comparative Vertebrate Embryology	5 units

These courses fulfill the biology requirements for admission to the Stanford University School of Medicine (see page 320) and for most other medical schools. For specific requirements of other medical schools consult the premedical advisers of the department. Biology 20 and 21 or Biology 1, 2, 3 fulfill the Lower Division requirement in the biological sciences.

PREDENTAL STUDENTS

The Council on Dental Education has fixed as the minimum basis for admission to an approved dental school the successful completion of two full academic years of work in an accredited college of liberal arts and science. The college course must include at least a year's credit in English, in biology, in physics, and in inorganic chemistry, and a half-year's credit in organic chemistry. All courses in science should include both class and laboratory instruction.

The predental requirement in biology may be fulfilled by taking either Biology 20, 21, and 22, or Biology 1, 2, and 3.

SUGGESTED PROGRAM OF STUDY

It is suggested that biology majors, including premedical students, may best complete the specific course requirements by adhering to the following program.

FIRST YEAR

	Autumn	Winter	Spring
Chemistry	1	2	3
History	10	11	12
English	(A)	2a	2b[e]
Language	1	2	3

SECOND YEAR

	Autumn	Winter	Spring
Biology	20[a]	21[a]	25[b]
Chemistry	121	123	—
Chemistry	122[c]	110[d]	—
Chemistry	—	111[d]	—
Social Science	(5 units)	—	(5 units)
Language	22	23	24

THIRD YEAR

	Autumn	Winter	Spring
Physics[c]	21	23	28
Physics	22	24	29
Biology	24[b]	22	23

[a] Biology 1, 2, and 3 may be substituted for Biology 20 and 21.

[b] Although these courses are not required for admission to Stanford Medical School, they are required for graduation in biology, and are valuable adjuncts to premedical preparation.

[c] Recommended but not required for a major in biology (see page 117 concerning minimal physical science requirement for graduation in biology).

[d] Not required for a major in biology.

[e] Premedical students are required to take 3 additional units of English.

THE TEACHER'S RECOMMENDATION

Programs are provided for candidates seeking either (*a*) General Secondary Credentials, with a teaching-major or a teaching-minor in biology, or (*b*) Junior College Credentials. Candidates holding the A.B. degree may satisfy the requirements for a General Secondary Credential by completing approved courses of study in biology and education in a minimum of three quarters of graduate study. Candidates who hold the degree of Master of Arts or Doctor of Philosophy may qualify for a Junior College Credential in Biological Sciences with a teaching-major or -minor in any one of the following fields: (*a*) Biological Sciences, (*b*) Botany, and (*c*) Zoology. In satisfying the requirements for a teaching credential the candidate may offer units transferred from other institutions, but at least one course of advanced character should be taken in this department. Some substitutions may be made for Biology 23, 24, and 25 with the approval of the adviser on teaching credentials of the Department of Biological Sciences. For the details of these programs the prospective candidate should consult pages 32–33, his adviser in the Department of Biological Sciences, and the credential secretary in the School of Education.

ADVANCED STUDY AND RESEARCH

Advanced courses and research are offered to qualified students in the following disciplines of the biological sciences which are well represented on the campus and at the Hopkins Marine Station: (*a*) plant systematics, animal systematics and related interests (bryology, entomology, herpetology, ichthyology, marine invertebrates); (*b*) plant morphology, invertebrate and vertebrate morphology; (*c*) experimental morphology, experimental embryology; (*d*) genetics, cytology, cytogenetics; (*e*) marine and fresh-water ecology, oceanography, experimental ecology, fisheries biology; (*f*) plant physiology, general physiology, photobiology, comparative physiology; (*g*) microbiology, protistology, parasitology; (*h*) biochemistry, biophysics.

The disciplines listed above are among those commonly pursued in universities by students looking toward teaching and research, and medicine. They may also serve, however, as an essential background and basic training toward desirable positions in various branches of applied science, especially in agricultural and industrial fields, and in governmental agencies. Students interested in such pursuits should confer with the head of the department, who may refer them to an appropriate adviser for assistance in the selection of courses in the department and adjacent fields best suited for training toward a chosen objective.

ADVANCED DEGREES

Graduate study and research leading to the degrees of Master of Arts and Doctor of Philosophy may be carried on in the biological laboratories on the campus or at the Hopkins Marine Station on Monterey Bay. Students properly qualified for enrollment in any of the advanced and research courses previously noted may find available exceptional facilities for research and adequate reference literature in the biological libraries.

A student who has fulfilled the requirements for the degree of Bachelor of Arts, or their approximate equivalent as determined by the department, may undertake graduate work. Before admission to candidacy for an advanced degree, a prospective candidate must conform to the regulations of the department as stated below and of the University as outlined in the ***Information Bulletin***.

The department requires of a prospective candidate for an advanced degree an adequate preparation for graduate study in his chosen field. This preparation must include not less than 10 units each in plant and animal biology. The department also requires a minimum of 15 units of advanced biology courses (beyond Biology 25 and exclusive of special problems and research courses) taken in graduate standing. Not more than 5 units toward this requirement may be offered from courses in the Departments of Anatomy, Chemistry (Biochemistry), Geology (Paleontology), and Physiology. Candidates for the degree of Master of Arts are required to have academic credit for one year of General Inorganic Chemistry (Chemistry 1, 2, and 3, 14 units, or equivalent), and 10 units of additional work in the Physical Sciences (Physics, Geology, or Mathematics). Candidates for the degree of Doctor of Philosophy are required to have credit for one year of General Inorganic Chemistry, a course in Organic Chemistry (Chemistry 121, 123, 6 units, or equivalent), and 4 additional units in the Physical Sciences. The study and research program of each prospective candidate must have, prior to his admission to candidacy, the approval of the major professor, the Graduate Adviser of the department, and the Committee on Graduate Study of the University.

An accepted candidate for the degree of Master of Arts in biological sciences must fulfill the University requirements for that degree and prepare and present a Master's thesis. The thesis may comprise (1) the results of a satisfactory research project or (2) a critical review of the literature in some specified field with or without laboratory research. Upon approval of the thesis by the professor in charge and by the department, recommendation will be made to the Committee on Graduate Study that the degree be conferred.

Before being recommended for admission to candidacy for the degree of Doctor of Philosophy, the prospective candidate will be required to pass a qualifying examination, under supervision of the department's Graduate Adviser not later than the fourth quarter of registration as a graduate student. The qualifying examination is given once a year near the end of the autumn quarter. It is expected that ordinarily all preliminary requirements will have been met and admission to candidacy granted before the end of the second quarter of the year preceding that in which the degree is sought. More information concerning the oral and thesis will be found in the *Information Bulletin* of the University. More detailed information and a time table for completion of requirements may be obtained from the secretary of the department.

Program for a Minor in Biological Sciences.—Candidates for the Ph.D. degree in other departments may qualify for a minor in biological sciences by passing Courses 20 to 25 inclusive, or their substantial equivalents. To meet individual needs in exceptional cases, a faculty committee will prescribe appropriate alternative groups of courses for fulfillment of the minor requirement.

BIOLOGY SEMINAR

The Biology Seminar meets on Monday afternoons at 4:15 P.M. Discussions are led by members of the department and guest speakers from other institutions. Open to all interested.

SEMINAR IN TECHNIQUES OF BIOLOGICAL RESEARCH

To acquaint beginning graduate students with the types of research represented in the Department, and with the principal techniques involved, visits to the laboratories of individual staff members will be arranged on dates announced at the beginning of each autumn quarter. The Seminar is intended primarily for candidates for the Ph.D. degree, and attendance is voluntary.

COURSES OF INSTRUCTION

[The letter h following a number indicates that the course is given at the Hopkins Marine Station.]

1, 2, 3. General Biology.—Designed to give an understanding of functional mechanisms in plants and animals and of major biological concepts, including their historical development and logical or experimental bases. Structure, function, and interrelationships of representative plants and animals are considered in the first two quarters with special attention to the physiology of higher plants and vertebrate animals. The third quarter is devoted to consideration of the principles of reproduction, development, inheritance, and evolution.

Primarily for students who do not intend to major in biology, but may serve as a prerequisite to Biology 22, and subsequent courses leading to fulfillment of degree or premedical requirements. Lectures, laboratory, and demonstrations. Enrollment only by signing class lists.

1. 3 units, autumn quarter (DuShane, Regnery)
Lec. WF 11; Lab. T 9–12 or 2–5, or W 8–11 or 2–5, or Th 9–12 or 2–5
[Also ordinarily offered summer quarter]
2. 3 units, winter quarter (DuShane, Regnery)
Lec. WF 11; Lab. T 9–12 or 2–5, or W 8–11 or 2–5, or Th 9–12 or 2–5
3. 3 units, spring quarter (DuShane, Regnery)
Lec. WF 11; Lab. T 9–12 or 2–5, or W 8–11 or 2–5, or Th 9–12 or 2–5

20. Introduction to Botany.—Structure, function, and relationships of plants.
5 units, autumn quarter (Page) Lec. MWF 8; Lab. TTh or WF 2–5

21. Introduction to Invertebrate Zoology.—Structure, function, and relationships of invertebrate animals. Prerequisite: Biology 20.
5 units, winter quarter (Oliphant) Lec. MWF 10; Lab. TTh or WF 2–5

22. Comparative Vertebrate Anatomy.—Structure and relationships of vertebrate animals. Prerequisites: Biology 1, 2, 3, or 21.
5 units, winter quarter (Bolin)
Lec. TWF 12; Lab. TTh or WF 9–12, or TTh or WF 2–5

23. Comparative Vertebrate Embryology.—Principles of vertebrate embryology, as exemplified in the development of amphibians, birds, and mammals. Prerequisite: Biology 22, or equivalent.
5 units, spring quarter (DuShane) Lec. TThS 10; Lab. WF 9–12 or TTh or WF 2–5

24. Cellular Physiology.—Fundamental activities of animals, plants, and micro-organisms. Prerequisites: Biology 1, 2, 3, or 20 and 21, or equivalents, and elementary chemistry and physics. It is preferred that students take organic chemistry before registering, or concurrently.
5 units, autumn quarter (Giese)
Lec. MWF 9; Lab. TTh or WF 1–3:30; Discussion T or Th 9

25. Genetics.—Principles of heredity in plants and animals. Prerequisites: Biology 1, 2, 3, or 20 and 21, or equivalents.
4 units, spring quarter (———) Lec. MTWTh 9

28. Classification of Flowering Plants.—Lectures, laboratory, and field studies. Prerequisite: General Biology, or equivalent.
4 units, spring quarter (Holm, Wiggins) TTh 2–5; S 9–12

29. Fungi.—An introduction to the study of the fungi. Prerequisite: Biology 20 or Biology 1, 2, and 3, or equivalents.
4 units, winter quarter (Page)
Lec. TTh 9; Lab. TTh 10–12 (and two hours by arrangement)

30. Evolution.—A survey of basic facts and principles, and of factors involved in organic evolution. Prerequisite: General Biology, or equivalent.
2 units, spring quarter (———) Lec. TTh 10

34. The Insects and Man.—Lectures and associated reading on the significance of the insects and certain other arthropods as factors in human ecology. Prerequisite: General Biology, or equivalent.
3 units, winter quarter (Ferris) MWF 10

36. Plants in Human Affairs.—Lectures and reading on the significance of plants in the development of our civilization. Special emphasis is placed on the economic importance of plants.
3 units, autumn quarter (Sterre) Lec. MWF 9

40. Ecology of Plants.—Lectures, assigned readings, and field excursions. Prerequisite: General Biology, or equivalent.
3 units, winter quarter (Wiggins) MWF 9
[In alternate years; given in 1954–55]

43. Forest Botany and Geographical Distribution.—Lectures, herbarium, and field study of the classification and distribution of woody plants. Prerequisite: Biology 28, or equivalent.
3 units, winter quarter (Wiggins) Lec. TTh 10; alternate Saturdays 8–4
[In alternate years; not given in 1954–55]

53. General Entomology.—Laboratory work, associated reading, and occasional lectures dealing with the general structure, biology, and classification of the insects and other terrestrial arthropods.
3 units, autumn quarter (FERRIS) MWF 2–5

60h. Ecology of Marine Animals.—Lectures, laboratory, and field work in the ecology of marine animals. Prerequisite: General Biology or Zoology (or concurrent registration in Course 111h).
5 units, summer quarter (first half) (BOLIN) TThS

100h. Marine Algae.—Lectures, laboratory, and field work on the various classes of algae. Open to elementary students.
5 units, summer quarter (first half) (HOLLENBERG) TThS

103. Comparative Histology.—A survey of the microscopic structure of animal tissues with special reference to the vertebrates. Prerequisite: Biology 22, or equivalent.
3 units, spring quarter (OLIPHANT) Lec. TTh 10; Lab. W 1–4

105. Immunology as Applied to Biology.—A course of lectures covering fundamental principles of immunology with emphasis on their relationship to certain problems in the field of biology. Prerequisite: General Biology and General Chemistry, or equivalents.
2 units, winter quarter (REGNERY) Lec. TTh
[In alternate years; given in 1954–55]

111h. Marine Invertebrates.—Structure, classification, and biology of the lower marine invertebrates. Prerequisite: elementary zoology course.
5 units, summer quarter (first half) (ABBOTT) TThS

112h. Marine Invertebrates (continued).—Continuation of Course 111h. While the two courses form a continuous sequence, either half may be taken with profit. Prerequisite: elementary zoology, preferably also Course 111h
5 units, summer quarter (second half) (ABBOTT) TThS

113. Invertebrate Biology.—Lectures, laboratory, and field studies in the ecology and evolution of terrestrial, freshwater, and marine invertebrates. Prerequisite: Biology 21 or equivalent.
4 units, spring quarter (ABBOTT) Lec. TTh 10; Lab. TTh 2–5; few Saturday field trips

114. Classification of Insects.—A survey of the major groups of the insects and other terrestrial arthropods, and the identification of specimens to the family. Intended for students who are interested in entomology as a profession or who may use it in teaching. Prerequisite: Biology 53.
3 to 5 units, spring quarter (FERRIS) By arrangement

116. Insect Morphology.—Laboratory, and associated reading on the detailed structure of insects. Intended for students interested in entomology as a profession. Prerequisite: Biology 53.
3 units (FERRIS) By arrangement

118. Special Problems in Entomology.—For Upper Division students in biology who have personal interests and needs in training in entomology. Prerequisite: Biology 53 or 34.
(FERRIS) By arrangement

120. Morphology of Algae and Fungi.—Structure and development of representatives of principal groups of algae and fungi. Prerequisite: Biology 20, or equivalent.
5 units, spring quarter (PAGE) Lec. MWF 10; Lab. WF 2–5

121. Morphology of Mosses and Ferns.—Structure and development of mosses and ferns, with emphasis on evolutionary trends. Prerequisite: Biology 20, or equivalent.
5 units, winter quarter (STEERE) Lec. MWF 10; Lab. WF 2–5

122. Morphology of the Seed Plants.—Anatomy and development of vegetative and reproductive structures of seed plants. Prerequisite: Biology 20, or equivalent.
5 units, autumn quarter (Wiggins) Lec. MWF 10; Lab. WF 2-5

124. Comparative Parasitology: Protozoa, Helminths.—Principal attention will be given to those forms parasitic in man and in animals and plants of importance in human economy.
4 units, autumn quarter (Oliphant) Lec. TTh 10; Lab. TTh 1-4

128. Protozoology.—Experimental study of unicellular animals, including organization, nutrition, response, reproduction, and cyclic phenomena.
4 units, spring quarter (Giese)
Lec. MW 9; Lab. M 1-4 (and one afternoon by arrangement)
[Given only on sufficient demand]

132. The Vertebrates.—Classification, morphology, and evolution of the vertebrates, designed to extend the survey of the vertebrates given in Biology 22. Prerequisite: Biology 22, or equivalent. Enrollment by permission only.
5 units, winter quarter (Myers) Lec. MWF 11; Lab. TTh 1-4

136h. General Ichthyology.—An introduction to the study of fishes, including the elements of morphology, taxonomy, embryology, natural history, and principles and techniques of conservation. Prerequisite: Biology 22, or equivalent.
5 units, summer quarter (second half) (Bolin) TThS
[In alternate years; given in 1954-55]

138. Systematic Herpetology.—An advanced lecture and laboratory survey of the living amphibians and reptiles of the world. Prerequisites: Biology 132, and permission of instructor.
4 units, spring quarter (Myers) By arrangement
[In alternate years; given in 1954-55]

146. Experimental Embryology.—Lectures on the experimental analysis of embryonic development by microsurgical methods and related techniques. Prerequisite: Biology 23.
3 units, autumn quarter (Twitty) MWF 10

147. Cytology.—Plant and animal cells in reproduction, growth, and differentiation. Prerequisites: Biology 1, 2, 3, or 20 and 21, or equivalents.
4 units, winter quarter (Holm) Lec. MWF 11; Lab. F 2-5

148. Genetics of Micro-organisms.—Inheritance, mutation, and gene action in bacteria, fungi, algae, and protozoa. Prerequisite: Biology 25, or equivalent.
3 units, autumn quarter (Tatum, Perkins) Lec. MWF 10
[Not given in 1954-55]

149. Advanced Genetics.—Advanced topics bearing on the nature of the gene and of gene action. Prerequisite: Biology 25, or equivalent.
3 units, winter quarter (Perkins) [Not given in 1954-55]

150. Genetics Laboratory.—Experiments with Drosophila and Neurospora. Enrollment by permission only.
2 units, spring quarter (———) By arrangement

151. Evolutionary Genetics.—Application of genetics to the study of evolution. Prerequisite: Biology 25.
2 units, winter quarter (Regnery) Lec. TTh
[In alternate years; not given in 1954-55]

152. Biochemical Genetics.—A survey of biochemical genetics and gene action in plants, animals and micro-organisms. Prerequisite: Biology 25 or equivalent.
3 units, autumn quarter (Tatum, ———) MWF 10
[Not given in 1954-55]

153h. General Microbiology.—The culture, morphology, general physiology, and ecology of representative types of micro-organisms. Prerequisites: elementary chemistry and biology. Organic chemistry desirable, but not a

prerequisite. Courses 153 and 154 form an integrated sequence, but either section may be taken separately.
5 units, summer quarter (first half) (VAN NIEL) [Not given in 1954–55]

154h. General Microbiology (continued).—The biochemical properties of micro-organisms. Prerequisites: Biology 153h, or an introductory course in general bacteriology; and organic chemistry (e.g., Chemistry 121 and 123).
5 units, summer quarter (second half) (VAN NIEL) [Not given in 1954–55]

160h. Cellular Physiology.—An introductory experimental course in general cellular physiology. Prerequisites: elementary physics, chemistry, and biology.
5 units, summer quarter (first half) (BLINKS) TThS

165. Plant Physiology.—The functions of root, stem, and leaf in the higher plants. Reading, conferences, and lectures. Prerequisites: Biology 20 and 24.
2 units, winter quarter (BLINKS) Lec. M 2–4
[In alternate years; not given in 1954–55]

166. Plant Physiology Laboratory.—Experiments designed to accompany Course 165. Admission limited, and only after consultation.
2 units, winter quarter (BLINKS) [In alternate years; not given in 1954–55]

167h. Comparative Animal Physiology.—Response, nutrition, and reproduction of animals, with special reference to the invertebrates. The laboratory work will deal primarily with marine animals.
5 units, summer quarter (second half) (GIESE) TThS

168. Comparative Animal Physiology.—Response, nutrition, and reproduction of animals with especial emphasis on the invertebrates. Prerequisites: Biology 21, 22, and 24, or equivalents. Laboratory work may be undertaken during the summer at the Hopkins Marine Station.
3 units, winter quarter (GIESE) Lec. MWF 9

170. Paleobotany.—Anatomy and morphology of fossil plants. Prerequisite: Biology 121, or 122, or equivalent.
4 units, autumn quarter (HOLM) Lec. TTh 11; Lab. TTh 2–5
[In alternate years; not given in 1954–55]

173. Bryology.—A systematic, distributional, and experimental study of mosses and hepatics, through field and laboratory work.
4 units, spring quarter (STEERE) Lec., Lab. TTh 1–5

174. Biogeography.—A seminar type of study of the geographical distribution and historical migrations of the natural populations of organisms. Open to Upper Division students.
2 units, spring quarter (MYERS, with co-operation of the Natural History Museum Staff) [In alternate years; given in 1954–55]

175h. Oceanography.—Lectures, field and laboratory work, serving as an introduction to the ocean. Prerequisites: Introductory courses in physics, chemistry, and biology.
5 units, summer quarter (second half) (BOLIN) TThS
[In alternate years; not given in 1954–55]

176. Limnology.—An introduction to the study of the biology of fresh waters. Lectures, laboratories, and field trips. Prerequisites: Biology 20 and 21.
4 units, spring quarter (WOHLSCHLAG) Lec. TTh 11; Lab. TTh 2–5
Field trips by arrangement

178. Principles of Conservation.—A study of biological problems and methods involved in the utilization and maintenance of renewable natural resources. Prerequisite: General Biology, or equivalent.
3 units, winter quarter (WOHLSCHLAG) Lec. MWF 11

179. Conservation Practices.—Special study and preparation of a written report on a selected topic for properly qualified students enrolled in Course 178. Enrollment by permission only.
2 units, winter quarter (WOHLSCHLAG) By arrangement

182. Special Problems in Fishery Biology.—Depending on the problem or problems selected, this course may be elected for more than one quarter by qualified students. Prerequisites: Upper Division or graduate standing, and permission of the instructor.
(WOHLSCHLAG) By arrangement

184. Principles of Systematic Biology.—A consideration of the theory, techniques, and nomenclatorial procedures employed in biological classification. Open to Upper Division and graduate students in biology, paleontology, or other biological fields.
2 units, spring quarter (FERRIS) By arrangement

185. Microtechnique.—Methods of preparing biological materials for microscopical study. Experience with histological and cytological techniques in the laboratory. Enrollment by permission only.
3 units, winter quarter (BOWEN) By arrangement

189. Quantitative Methods in Biology.—Discussion and application of basic statistical methods to biological data, including a brief survey of more advanced techniques. Prerequisite: Statistics 50, or by permission.
3 units, autumn quarter (WOHLSCHLAG) Lec. TTh 9; Lab. T 2-5
[In alternate years; given in 1954-55]

190. Methods of Fishery Investigations.—A study of the techniques for determination of growth rates, mortality rates, optimum yields, population estimates, production, and population distribution. For advanced fishery students. Enrollment by permission only.
4 units, autumn quarter (WOHLSCHLAG) MWF
[In alternate years; not given in 1954-55]

191. History of the Biological Sciences.—A lecture and reading course. Primarily for graduates and advanced undergraduates. (Same as Physiology 191.)
3 units, spring quarter (BAUMBERGER) By arrangement

192. Special Problems in the History of the Biological Sciences.—Prerequisite: Biology 191, or equivalent. (Same as Physiology 192.)
Autumn, winter, and spring quarter (BAUMBERGER) By arrangement

193. Studies in the Historical Development of Natural History.—Directed readings and discussions. Open to all students by permission of the instructor. May be elected for two quarters.
2 units, autumn quarter (MYERS) By arrangement

194. Special Problems in Taxonomic Botany.—Open to Upper Division or graduate students on permission of the instructor.
(HOLM, STEERE, WIGGINS) By arrangement

195. Seminar in Mycology.—Discussion of selected topics in mycology. Enrollment by permission only.
1 unit, spring quarter (PAGE) By arrangement

196. Seminar in Fishery Biology.—Special topics in current fisheries research, held in collaboration with professional workers in local governmental fisheries agencies.
1 unit, autumn, winter, and spring quarters (WOHLSCHLAG) By arrangement

197. Special Problems in Vertebrate Biology.—Individual study of problems involving special or original work in the systematics, morphology, ecology, or geographical distribution of the vertebrates. May be elected for more than one quarter, on permission of instructor.
(MYERS) By arrangement

199. Special Problems.
(STAFF) By arrangement

199h. Special Problems.
(HOPKINS MARINE STATION STAFF) By arrangement

200. Senior Honors Program.—Senior students (or students in the last quarter of their junior year) majoring in Biology who have demonstrated superior scholarship (grade average of 2.5 or better), or outstanding interest and ability in biology, may apply for the privilege of electing Honors work during the senior year. This program will consist of readings or of actual investigations covering some phase of biology of especial interest to the individual student, under the sponsorship of one or more staff members. Satisfactory completion will lead to recommendation for graduation with Honors in Biology. Number of units to be determined by consultation with faculty adviser. (No more than six units of Honors work may be applied toward the 12 units of electives required for graduation in Biology.)
(STAFF) By arrangement

210. Advanced Plant Morphology.
(STAFF) By arrangement

212. Phylogeny of the Angiosperms I.—A critical study of selected families of the flowering plants, with particular attention to relationships. Prerequisite: Biology 28, or equivalent.
4 units, winter quarter (WIGGINS) TTh 11 (and 2 laboratory periods by arrangement)
[In alternate years; given in 1954–55]

213. Phylogeny of the Angiosperms II.—A continuation of Biology 212.
4 units, winter quarter (WIGGINS) TTh 11 (and 2 laboratory periods by arrangement)
[In alternate years; not given in 1954–55]

214. Biosystematics.—A study of some of the major relationships of cytology, genetics, and morphology to systematic botany. Prerequisite: Biology 28, or equivalent.
3 or 4 units, spring quarter (HOLM) Lec. MWF 11; Lab. by arrangement

216. Field Problems in Geographical Distribution.—A student electing this course must be prepared to devote his whole time to the problem during the quarter selected, furnish his own transportation to and from and in the field, and his own camping equipment when necessary.
15 units, autumn, spring, or summer quarter (STAFF) By arrangement

230. Advanced Systematic Ichthyology I. — An intensive lecture and laboratory course extending through two quarters. Prerequisites: Biology 132 and 136. Open only to especially qualified advanced and graduate students upon permission of the instructor.
4 units, autumn quarter (MYERS) By arrangement
[In alternate years; not given in 1954–55]

231. Advanced Systematic Ichthyology II.—Continuation of Biology 230.
4 units, winter quarter (MYERS) By arrangement
[In alternate years; not given in 1954–55]

240. Seminar in Microbiology.—Discussion of current literature and research in biochemistry and genetics of micro-organisms. Open to undergraduates by permission only.
1 unit, winter and spring quarters (TATUM) By arrangement

241. Seminar in Genetics.—Discussion of current literature and research. Open to undergraduates by permission only.
1 unit, autumn quarter (———) By arrangement

242. Comparative Biochemistry.—A comparative survey of the most important biochemical activities of plants, animals, and micro-organisms. Prerequisite: organic chemistry. Enrollment by permission only.
3 units, winter quarter (TATUM) Lec. MWF 10

244. Photobiology.—General physiology of the responses of organisms to radiant energy. Lectures, demonstrations, readings, and reports.
3 units, spring quarter (GIESE) MW 9
[Given only on sufficient demand]

245. Electrobiology.—Bio-electric phenomena in plants and animals.
2 units, winter quarter (BLINKS) M 2–4
[In alternate years; given in 1954–55]

246. Seminar in General Physiology.—Discussion of current research in general physiology. Enrollment by permission only.
1 unit, winter quarter (GIESE) By arrangement

247. Advanced Cellular and Comparative Physiology.—Discussion of a selected topic. Prerequisites: Biology 24 and 168, or equivalents. Enrollment by permission only.
2 or more units, spring quarter (GIESE) By arrangement

250. Philosophy of Biology.—A survey of biological thought, with especial emphasis upon the development of present-day concepts of man's relation to and place in the natural world. Limited to Upper Division and graduate students in biology.
3 units, autumn quarter (FERRIS, with co-operation of STAFF) MWF 9

255. Museum Methods in Natural History (Zoology).—Practical work in the handling and care of zoological research collections, with discussions on the organization and administration of natural history museums. Open to Upper Division and graduate students in biology, with permission of instructor.
2 to 4 units (MYERS, with assistance of MUSEUM STAFF) By arrangement

256. Herbarium Methods in Natural History.—Practical work in the preparation, care, and identification of botanical research collections. Open to Upper Division and graduate students in biology only after consultation with the instructor.
2 to 4 units, any quarter (HOLM and HERBARIUM STAFF) By arrangement

270. Biological Literature.—Methods of using biological literature and libraries, with special attention to research. Open to advanced and graduate students on permission of instructor.
1 unit, autumn and spring quarters (MYERS) By arrangement

300. Research.
(STAFF) By arrangement

300h. Research.
(HOPKINS MARINE STATION STAFF) By arrangement

DIVISION OF MARINE BIOLOGY AND OCEANOGRAPHY

HOPKINS MARINE STATION

LAWRENCE ROGERS BLINKS, Director
ROLF LING BOLIN, Assistant Director
ARTHUR CHARLES GIESE, CORNELIS BERNARDUS VAN NIEL, Professors
DONALD PUTNAM ABBOTT, Assistant Professor

The Hopkins Marine Station is situated at Pacific Grove, on the south side of Monterey Bay, ninety miles from Palo Alto. The ground area comprises seven and a half acres, consisting of the main portion of Cabrillo Point, with complete control of the coast line of the Point and including an excellent sheltered landing place and harbor for boats. There are two well-equipped buildings, the Alexander Agassiz Laboratory and the Jacques Loeb Laboratory. The library is especially endowed, and subscribes to about fifty journals. Its collections are especially rich in marine biology, oceanography, and microbiology.

The Station is open during the entire year and maintains a permanent staff of resident investigators and technical assistants; this staff is increased by visiting faculty members, especially during the summer. There are facilities for visiting investigators and for elementary and advanced instruction in biology. For further information, see the *Hopkins Marine Station Bulletin* issued in March.

ADMISSION AND FEES

Candidates for admission should make application to the Director, Hopkins Marine Station, Pacific Grove. The application should state whether admission to the Lower, Upper, or Graduate Division as a matriculated student is desired; or whether the student wishes to register on the non-matriculated basis (available in summer quarter only).

Matriculated Basis.—Students who have been admitted to the University and wish to receive credit toward a degree should register as matriculated students.

Non-matriculated Basis.—Students from institutions which have agreed to accept work completed at the Station in fulfillment of their requirements and other students not expecting degree credit at Stanford should register as non-matriculated students (summer quarter).

(For detailed information regarding procedure and credentials necessary for admission, see the *Hopkins Marine Station Bulletin.*)

The tuition and required fees for all students at the Hopkins Marine Station are $250 per quarter. In the summer, half-quarter registration (two courses, ten units) will be at the rate of $140. This does not apply to half-time full quarter.

Visiting investigators will be charged a minimum fee of $50 per quarter or fraction thereof; and for the use of larger or more expensive equipment upward of $100 per quarter.

AUTUMN, WINTER, AND SPRING QUARTER COURSES

Although formal courses will not be offered, the staff will welcome the opportunity to direct work of graduate and undergraduate students in the fields indicated. Owing to superior conditions of tides and weather, the autumn and spring quarters are especially recommended for research involving marine organisms.

199h. Special Problems.—Properly qualified Upper Division students may undertake individual work in the fields indicated under Course 300h. Such studies are intended to introduce the serious student to methods of research. Arrangements must be made by consultation or correspondence.
(DEPARTMENT STAFF) By arrangement

300h. Research. — Problems involving original work may be undertaken with members of the staff in the fields indicated.

Marine Zoology.—Problems connected with the anatomy, taxonomy, and natural history of oceanic vertebrates. Invertebrate ecology.
(ABBOTT)

Physiology.—Problems of general and cellular physiology, especially of marine plants. Permeability, photosynthesis, and bioelectric phenomena are especially under study.
(BLINKS)

Marine Fishes.—Morphology, taxonomy, embryology, and ecology of marine fishes.
(BOLIN)

Physiology.—Problems on the physiology of invertebrate animals; photobiology, especially the effects of ultra-violet light.
(GIESE)

Microbiology.—Morphology, taxonomy, and biochemistry of the various groups of micro-organisms.
(VAN NIEL)

SUMMER QUARTER COURSES

The summer quarter is divided into two half-quarters of about five weeks each. Those courses requiring the lower tides of early summer are scheduled in the first half. It is possible to register for either half, or for the full quarter.

The regular five-unit laboratory courses are scheduled for three alternate days per week, an average of twenty hours per week being required. It is possible to obtain ten units in each half-quarter, but registration for more than fifteen units in the full quarter is not ordinarily advisable, owing to the intensive schedule.

For detailed descriptions of courses, see listings above, under Biological Sciences; also the *Hopkins Marine Station Bulletin* (issued in March).

FIRST HALF

60h. Ecology of Marine Animals.
5 units (Bolin) MWF

100h. Marine Algae.
5 units (———) TThS

111h. Marine Invertebrates.
5 units (Abbott) TThS

153h. General Microbiology.
6 units (van Niel) MWF

160h. Cellular Physiology.
5 units (Blinks) TThS

199h. Special Problems.—(See autumn, winter, spring quarters, above.)
(Staff) By arrangement

300h. Research.—(See autumn, winter, spring quarters, above.)
(Staff) By arrangement

SECOND HALF

112h. Marine Invertebrates (continued).
5 units (Abbott) TThS

136h. General Ichthyology.
5 units (Bolin) MWF

154h. General Microbiology (continued).
6 units (van Niel) MWF

167h. Comparative Physiology.
5 units (Giese) TThS

175h. Oceanography.
5 units (Bolin) [Not given in 1954–55]

199h. Special Problems.—(See under First Half.)
(Staff) By arrangement

300h. Research.—(See under First Half.)
(Staff) By arrangement

DIVISION OF NATURAL HISTORY

NATURAL HISTORY MUSEUM

LeRoy Abrams, Willis Horton Rich, Professors Emeriti
Albert W. C. T. Herre, Curator Emeritus

Ira Loren Wiggins, Professor of Biology, Director
Gordon Floyd Ferris, Professor of Biology, Curator of the Entomological Collections
George Sprague Myers, Professor of Biology, Curator of the Zoological Collections
William Campbell Steere, Professor of Biology, Curator of Cryptogams in the Dudley Herbarium
Donald Eugene Wohlschlag, Assistant Professor of Biology

Richard William Holm, Assistant Professor of Biology, Curator of the Dudley Herbarium
Roxana Stinchfield Ferris, Assistant Curator of the Dudley Herbarium
Margaret Hamilton Storey, Assistant Curator of the Zoological Collections
Laurence Monroe Klauber, Alan Cowie Taft, Lecturers

The Natural History Museum has for its general purpose the maintenance of provisions: (1) for proper housing and care of the systematic collections of animals and plants; (2) for furthering the growth and development of the collections through explorations; (3) for instruction, investigation, and research in systematics, geographical distribution, ecology, and the general field of natural history. It is housed in the west wing of the Museum Building, a fireproof structure where instruction and research utilizing the collections are conducted. Facilities are available for a limited number of graduate students and qualified investigators to carry forward their research problems.

Advanced courses and research leading to the degrees of Master of Arts and Doctor of Philosophy are offered at the Museum in the following fields: (*a*) Botany (morphology, distribution, and taxonomy of vascular plants); (*b*) Entomology (morphology, life histories, and taxonomy of insects); (*c*) Zoology (fisheries biology, ichthyology, and herpetology, including taxonomy, morphology, ecology, and distribution).

Dudley Herbarium

The Dudley Herbarium, named in honor of Professor William Russel Dudley, is especially rich in material from western North America, including northwestern Mexico, and offers unusual facilities for critical systematic and distributional studies of the floras of those regions. The Harvey Herbarium, comprising about 65,000 sheets, and the herbarium of the late Dr. Herman Knoche, containing over 125,000 sheets, both furnish authentic material from Europe and the Mediterranean regions. They contain many historical, frequently cited specimens and are of great value to investigators studying plants recently introduced into North America or those closely related to Old World species. The collections of cryptogamic and phanerogamic plants in the Dudley Herbarium now number about 500,000 specimens.

Botanical exploration work is carried on each season by one or more members of the Herbarium staff, and properly qualified students are encouraged to participate in this work. This field work may be partially carried on in connection with Biology 216 (Field Problems in Geographical Distribution) by properly prepared students.

Entomological Collections

The entomological collections are rich in material suitable as a basis for research, especially in certain groups. The collections of Mallophaga and Anoplura are almost unrivaled and that of Coccidae is one of the most important in existence, while smaller groups of ectoparasites are well represented. All of these collections contain large numbers of types and other especially important material. Much material of other insect orders, especially from the western United States, is available to the research student.

Zoological Collections

The actively growing collection of fishes is one of the largest and most important in the world, its basis being the material collected by Dr. David Starr Jordan, and his associates and students. The marine and fresh-water fishes of both eastern and western North America, the West Indies, Central America, Japan, eastern China, the Philippines, the Malay Peninsula, Hawaii, and Polynesia are very well represented. In addition, there are large bathyal collections from the North Pacific and other parts of the world, as well as extensive series of the fishes of Peru, Colombia, the Galapagos Islands, Venezuela, British Guiana, the Amazon, Cameroon, South and East Africa, India, the Malay Archipelago, and Australia.

The herpetological collections contain an extensive representation of the amphibians and reptiles of the West and considerable material from southeastern Asia and tropical America. The Museum also has a fine representation of the birds and mammals of the Western States. The collection of marine invertebrates is rich in echinoderms, crustaceans, and cephalopods, and contains good working nuclei in other groups. The series of deep-sea forms is especially good.

COURSES OF INSTRUCTION

Courses offered by members of the staff of the Natural History Museum are described on pages 120–127.

CHEMISTRY AND CHEMICAL ENGINEERING

JOHN PEARCE MITCHELL, ROBERT ECKLES SWAIN, Professors Emeriti

GEORGE SUTTON PARKS, FREDERICK OTTO KOENIG, PHILIP ALBERT LEIGHTON, HUBERT SCOTT LORING, JAMES MURRAY LUCK, CARL ROBERT NOLLER, RICHARD ANDREW OGG, JR., JAMES HOLLINGSWORTH CLEMMER SMITH (By Courtesy), Professors

WILLIAM ANDREW BONNER, RICHARD HALLENBECK EASTMAN, AMOS CLARK GRIFFIN, STUART WOOD GRINNELL, ERIC HUTCHINSON, HAROLD SLEDGE JOHNSTON, HARRY STONE MOSHER, DOUGLAS ARVID SKOOG, Associate Professors

RALPH ROBERT PAXTON, ———, Assistant Professors

JACK JAMES GORDON, NEVIN KAY HIESTER, KENNETH EVAN LUNDE, Lecturers in Chemical Engineering

ENTRANCE PREPARATION

Students who intend to major in chemistry are expected to offer entrance credit in the preparatory subjects of chemistry, biology, mathematics (including trigonometry and solid geometry), and German (2 units). Those who do not have entrance credit or equivalent training in the foregoing subjects may experience some difficulty, especially in the chemical engineering course, in meeting the departmental requirements for graduation in the usual time.

REQUIREMENTS FOR GRADUATION

Candidates for graduation with chemistry or chemical engineering as the major subject are required to have received an average grade of at least C in their chemistry courses. They must offer the equivalent of at least 18 units of college work in German, or 12 units of German and 12 units of French or

Russian. Whenever possible, this foreign language should be completed before the Upper Division work is begun. Under certain conditions, chemical engineering students will be permitted to substitute advanced technical courses for part of the language requirement.

Major students should complete the courses listed under one of the following curricula to meet the requirements for the degree of Bachelor of Science. The requirement in physics may be satisfied bv completing either of the series of Courses 21, 22, 23, 24, 28, 29 or 51, 53, 55, 57. The second series is required for chemical engineering students, and it is recommended to those pursuing curriculum A or B. The required work in advanced chemistry courses noted below may include any lecture courses not previously listed among the required courses in the curriculum chosen.

The following representative programs are suggested: Unless entrance deficiencies, etc., require important changes, it is recommended that they be followed rather closely as given. Students planning to continue for advanced degrees are urged to make use of the allowance for electives to fulfill in part the requirements in chemistry and allied subjects attendant upon the particular advanced degree. Elective courses may be chosen from any of those offered by the University. Courses offered by other departments and of particular interest to chemistry and chemical engineering majors are the following: Bacteriology 101; Biology 25, 153*h*, 154*h*, and 160*h*; Economics 1, 2, and 81; Electrical Engineering 100, 104, 105, and 143; Speech and Drama 1, 2, and 20; Mineral Sciences G1*a*, G25, G170, M102, M104, M106, M107, and M108; Mathematics 24, 130, 131, 132; and Physics 91, 93, 94, 111, 113, 115, 161, and 162.

A. GENERAL CHEMISTRY

[Recommended for those who are pursuing work in chemistry particularly as a basis for teaching and scientific research.]

Requirements: Lower Division requirements; German (see page 131); English 129; Mathematics 10, 11, 21, 22, 23, or 41, 42, 43; Physics (see page 132); Chemistry 1, 2, 3, 20, 112, 113, 114, 115, 121, 122, 123, 124, 125, 126 (or 130), 171, 173, 175, 176, 190 (at least 6 units) and advanced lecture courses in chemistry (at least 6 units).

1. FOUR-YEAR GENERAL CHEMISTRY PROGRAM

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, 3	4	4	5
English 2*a*, 2*b*	3	3	..
German G1, G2, G3	4	4	4
History 10, 11, 12	4	4	4
Physical Education	1	1	1
Electives	..	..	2
	16	16	16

SECOND YEAR

	Autumn	Winter	Spring
Chemistry 20, 112, 114	4	2	2
Chemistry 113, 115	..	4	3
German G22, G23	3	..	3
Mathematics 10, 11, 21	3	3	3
Social Sciences (see Lower Division requirements)	5	5	..
Physical Education	1	1	1
Electives	..	..	3
	16	15	15

THIRD YEAR

	Autumn	Winter	Spring
Chemistry 121, 123, 125	3	3	3
Chemistry 122, 124	..	3	3
English 129	..	..	3
Mathematics 22, 23	3	3	..
Physics 51, 55, 53	5	5	5
Electives	3	..	..
	14	14	14

FOURTH YEAR

	Autumn	Winter	Spring
Chemistry 171, 173, 175	3	3	3
Chemistry 176	..	..	3
Chemistry 126 or 130, 190	3	3	3
Physics 57	3	..	..
Electives	6	8	5
	15	14	14

2. FOUR-YEAR CHEMISTRY PROGRAM WHICH COMPLETES PREMEDICAL REQUIREMENTS IN THREE YEARS

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, 3	4	4	5
Biology 20, 21	5	5	..
English 2a, 2b	..	3	3
History 10, 11, 12	4	4	4
Electives	..	..	3
Physical Education	1	1	1
	14	17	16

SECOND YEAR

	Autumn	Winter	Spring
Chemistry 20, 112, 113, 114, 115	4	6	5
Physics 21, 22, 23, 24, 28, 29	4	4	5
German 1, 2, 3	3	3	3
Social Science	5	..	..
Physical Education	1	1	1
	17	14	14

THIRD YEAR

	Autumn	Winter	Spring
Chemistry 121, 122, 123, 124, 125	3	6	6
Biology 22, 23	..	5	5
Mathematics 10, 11, 21	3	3	3
English 129	3	..	..
German 22, 23	3	3	..
Social Science	5	..	..
Electives	..	..	3
	17	17	17

FOURTH YEAR

	Autumn	Winter	Spring
Chemistry 171, 173, 175, 176	3	3	6
Chemistry 126 or 130, 190	3	6	3
Mathematics 22, 23	3	3	..
Electives and advanced chemistry	6	3	6
	15	15	15

[There are many ways in which this program can be worked out if, *and only if*, two laboratory courses are taken throughout the first year. These could be (in addition to Chemistry 1, 2, 3) Biology 20, 21; Biology 1, 2, 3; or Physics 21–29. Biology 22 and 23 and Organic Chemistry could be taken in the second year instead of the third year. Because of the heavy laboratory load, Biology 22 and Chemistry 112, 113 should not be scheduled for the same year.]

B. BIOLOGICAL CHEMISTRY

[Particularly adapted to students who are looking forward to work in medicine or entrance into biochemical practice and research.]

Requirements: Lower Division requirements; English 129; German (see page 131); Mathematics 10, 11, 21, 22, 23, or 41, 42, 43; Physics (see page 132); Chemistry 1, 2, 3, 20, 112, 113, 114, 115, 121, 122, 123, 124, 125, 126 (or 130), 141, 142, 143, 144, 145, 171, 173, 175, 176, 190 (at least 6 units).

FOUR-YEAR BIOLOGICAL CHEMISTRY PROGRAM

FIRST, SECOND, AND THIRD YEARS

(The same as Curriculum A.)

FOURTH YEAR

	Autumn	Winter	Spring
Chemistry 141, 143, 145	3	3	3
Chemistry 142, 144	2	2	..
Chemistry 171, 173, 175	3	3	3
Chemistry 126 (or 130), 176	3	..	3
Chemistry 190	..	6	..
Physics 57	3	..	..
Electives	..	..	6
	14	14	15

C. CHEMICAL ENGINEERING

[This curriculum includes work required for the degree of Bachelor of Science in chemical engineering. Because of the necessity that chemical engineers have a basic well-rounded training in the science of chemistry as well as in the principles of engineering, this curriculum is more extensive than the average and is recommended only for students who are able to maintain a satisfactory grade average and who contemplate graduate study or desire to follow a professional career in chemical engineering.]

Requirements: Lower Division requirements; German (see page 131); Mathematics 10, 11, 21, 22, 23, and 24, or 41, 42, 43, and 24; Physics (see page 132); Civil Engineering 99, 100*n*, 110, 112; Electrical Engineering 100, 102; Industrial Engineering 130; Mechanical Engineering 8, 10, 133; Mineral Sciences M104; Chemistry 1, 2, 3, 20, 112, 113, 121, 122, 123, 124, 125, 161, 167, 169, 171, 173, 175, 176, 183, 184, 185, 186, 187.

FOUR-YEAR CHEMICAL ENGINEERING PROGRAM

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, 3	4	4	5
Mathematics 41, 42, 43	5	5	5
History 10, 11, 12	4	4	4
English 2*a*, 2*b*	3	3	..
Mineral Sciences M104	..	..	3
Physical Education	1	1	1
	17	17	18

SECOND YEAR

	Autumn	Winter	Spring
Chemistry 20, 112, 161	4	2	3
Chemistry 113	..	4	..
Mathematics 24	3	..	..
Physics 51, 53, 55	5	5	5
Social Science	5	5	..
Civil Engineering 99	..	..	5
Mechanical Engineering 8	..	..	4
Education	1	1	1
	18	17	18

THIRD YEAR

Chemistry 171, 173, 175	3	3	3
Chemistry 167, 176	..	3	3
Chemistry 121, 123, 125	3	3	3
Chemistry 122, 124	..	3	3
German G1, G2	4	..	4
Civil Engineering 110, 100*n*	4	5	..
Civil Engineering 112	1	..	..
Physics 57	3	..	..
	18	17	16

FOURTH YEAR

Chemistry 183, 185, 187	5	3	3
Chemistry 169, 184, 186	3	4	3
Mechanical Engineering 133, 10	..	3	4
German G3, G22, G23*a*	4	3	3
Industrial Engineering 130	..	..	3
Electrical Engineering 100, 102	3	3	..
	15	16	16

THE TEACHER'S RECOMMENDATION

The requirements for certification to teach chemistry in the secondary schools and junior colleges of California may be ascertained by consulting pages 32–33 and the credential secretary of the School of Education.

ADVANCED DEGREES

The general University regulations for advanced degrees are stated in the *Information Bulletin.* All candidates for advanced degrees are required to have received an average grade of at least B in all course work (exclusive of Chemistry 200) taken during graduate study.

Applicants for the degree of Master of Science in chemistry, except those majoring in chemical engineering, will be expected to complete, in addition to the requirements for the Bachelor's degree, the equivalent of 45 units of work in the University, of which approximately two-thirds must be in the department. This work will include a thesis based on laboratory work. A minimum of 15 units of advanced course work (exclusive of the thesis) in chemistry and allied sciences is required. Bacteriology 101, or 225 and 226, or Biology 153*h* and 154*h* also must be taken by all students who are majoring in biochemistry.

Applicants for the degree of Master of Science in chemical engineering are required to complete a total of 45 units of graduate study in addition to the courses listed under curriculum C above. These 45 units shall include a thesis and the following courses: Chemistry 126, 259, 272, Mineral Sciences M102*a*,*b*, and 6 units of advanced mathematics or engineering mathematics.

The degree of Engineer in chemical engineering represents a minimum of six quarters of graduate study. In addition to completion of the course work listed in curriculum C, the candidate for the Engineer's degree shall present a thesis based on laboratory work and a minimum of 15 units of graduate course work in chemistry, and at least 30 units of advanced work in engineering, totaling at least 90 units of graduate study including the thesis.

Candidates for the degree of Doctor of Philosophy in chemistry and chemical engineering are required to take preliminary qualifying examinations. Normally these will be taken within the first year or immediately after obtaining the M.S. degree. These examinations cover the four fundamental fields of chemistry (Inorganic, Analytical, Organic, and Physical) and are offered on the Thursday, Friday, and Saturday preceding autumn and spring quarters; they consist of four written examinations of approximately two hours duration each and are intended to test the candidate's knowledge and ability in these basic fields of chemistry. For students majoring in chemical engineering, the four examinations will be in general engineering, basic chemical engineering, physical chemistry, and a choice of any one of the remaining three chemistry examinations.

Qualified doctorate candidates will then follow such courses as are approved by the department faculty, subject to general University regulations (see *Information Bulletin*). They will be considered responsible for an integrated knowledge of their field of specialization which will not be limited to the content of related advanced courses offered by the department. Normally they will register for at least 15 units of such advanced course work. If a formal minor subject in another department is not chosen, candidates are required to present a minimum of 20 units of advanced course work in fields of chemistry other than the field of specialization, in allied sciences, or in both. In any event 15 units of mathematics (analytic geometry and calculus) and 13 units of physics (including atomic physics), ordinarily completed during undergraduate work, must be presented. If the Ph.D. degree is not obtained within a period of six years from the date of enrollment in graduate school, it will be necessary for the student to repeat and pass the qualifying examinations before the degree will be granted. A written comprehensive examination in biochemistry of two hours' duration is required of those students proceeding to the doctorate in biochemistry. This will be given on the third Monday in the month of January of the calendar year in which the oral examination is taken.

In addition to the requirements of the University Committee on Graduate Study governing the University oral examination, candidates are required, at least three weeks before this examination, to arrange an informal private conference with each member of the chemistry staff in residence at the time. Admission to the oral examination will be contingent upon a satisfactory report from the staff members thus interviewed. The University oral examination may not be taken during the summer quarter except after favorable action on special petition filed not later than the third week of spring quarter.

Candidates for the Doctor of Philosophy degree in other departments who wish to minor in chemistry should have completed at least 30 quarter units in chemistry, including General Chemistry, and those advanced courses most directly related to the major subject. A brief oral or written examination may be required.

It is the policy of the department to encourage and support in every possible way the pursuit of research and of other work along advanced lines by qualified students. A list of the published papers, and other information in regard to the research work carried on in the department during the past academic year, will be sent upon application.

FELLOWSHIPS AND SCHOLARSHIPS

In addition to the University fellowships and scholarships which are open to properly qualified students, there are at present a number of departmental fellowships in chemistry: American Cyanamid Company Graduate Fellowship, Dow Chemical Company Fellowship, duPont Fellowship, Edward Curtis Franklin Fellowship, Eli Lily Fellowship, Parke, Davis Research Fellowship, and Frederick P. Whitaker Fellowship. These are granted only to graduate students or as postdoctorate awards. The David L. and Lavinia E. Sloan Memorial Scholarships, John Maxson Stillman Scholarship, and Henry Windt Junior Memorial Scholarship are open to graduates and undergraduates. There are also several teaching assistantships and research assistantships open to advanced students.

COURSES OF INSTRUCTION

[Deposits required in laboratory courses, against which charges are made for breakage, loss of apparatus, chemicals, etc., are from $5 to $20 per quarter.]

GENERAL AND INORGANIC CHEMISTRY

1. General Chemistry.—Open to all students.
4 units, autumn quarter (EASTMAN, HUTCHINSON, JOHNSTON, KOENIG, LEIGHTON)
Lec. (I) MWF 8, (II) MWF 9, (III) TThS 8, (IV) TThS 9; Lab.(I) T 9–12, (II) Th 9–12, (III) T 2–5, (IV) W 2–5, (V) Th 2–5, (VI) F 2–5

2. General Chemistry.—Continuation of Chemistry 1.
4 units, winter quarter (EASTMAN, HUTCHINSON, JOHNSTON, KOENIG, LEIGHTON)
Lec. and Lab. sections same as under Chemistry 1

3. General Chemistry.—Continuation of Chemistry 2. **For all students except those majoring in the School of Engineering.**
5 units, spring quarter (HUTCHINSON, JOHNSTON, KOENIG, LEIGHTON)
Lec. (I) MWF 8, (II) MWF 9, (III) TThS 9; Lab. (I) TTh 9–12, (II) TTh 2–5, (III) WF 2–5

4. General Chemistry.—Continuation of Chemistry 2. **For students majoring** in the School of Engineering.
3 units, spring quarter (EASTMAN) TThS 8

130. Inorganic Chemistry.—Together with Course 131, this course comprises a survey of descriptive inorganic chemistry. Prerequisite: Chemistry 3.
2 units, winter quarter (OGG) TTh 11

131. Inorganic Chemistry.—A continuation of Chemistry 130.
2 units, spring quarter (OGG) TTh 11

139. Radiochemistry.—A series of lectures on radioactive isotopes including such topics as methods of measurement, radioactive decay, absorption curves, construction and calibration of β-counter tubes, manipulation of highly active samples, and application of tracers to research.
2 units, winter quarter (HUTCHINSON) TTh 8
[In alternate years; not given in 1954–55]

231. The Ammonia System of Compounds.—Experimental lectures on compounds related to ammonia as the familiar oxygen acids, bases, salts, etc., are related to water. This includes the chemistry of organic nitrogen compounds. Prerequisite: Chemistry 123.
3 units, autumn quarter (OGG) MWF 9
[In alternate years; not given in 1954–55]

ANALYTICAL CHEMISTRY

20. Qualitative Analysis.—Deals with the qualitative analysis of inorganic substances. Prerequisite: Chemistry 3 or 4.
4 units, autumn quarter (OGG) Lec. TTh 11; Lab. MW or TTh 2–5

110. Elementary Quantitative Analysis.—For students other than chemistry majors. Concurrent registration in Chemistry 111 required. Prerequisite: Chemistry 3 or 4.
2 units, autumn quarter (SKOOG) TTh 10
2 units, *winter quarter (———) TTh 11

111. Elementary Quantitative Analysis Laboratory.—Concurrent registration in Chemistry 110 required.
3 units, autumn and *winter quarters (SKOOG, ———) MWF 1–4

112. Quantitative Analysis.—For chemistry majors. Concurrent registration in Chemistry 113 required. Prerequisites: Chemistry 3 and 20.
2 units, winter quarter (SKOOG) TTh 10

113. Quantitative Analysis Laboratory. — Concurrent registration in Chemistry 112 required.
4 units, winter quarter (SKOOG) 4 afternoons

114. Quantitative Analysis.—A continuation of Chemistry 112. Concurrent registration in Chemistry 115 required. Prerequisite: Chemistry 112.
2 units, spring quarter (SKOOG) TTh 11

115. Quantitative Analysis Laboratory. — Concurrent registration in Chemistry 114 required.
3 units, spring quarter (SKOOG) 3 afternoons

216. Advanced Analytical Chemistry. — Selected topics in quantitative analysis. Prerequisites: Chemistry 114 and 123.
3 units, autumn quarter (SKOOG) MWF 10
[In alternate years; given in 1954–55]

218. Instrumental Analysis.—Lectures on the theory and application of instrumental analysis. Prerequisites: Chemistry 114, 123, and concurrent registration in 173.
3 units, winter quarter (SKOOG) MWF 10
[In alternate years; not given in 1954–55]

219. Analytical Chemistry Seminar.—This course may be repeated for credit.
1 unit, autumn, winter, and spring quarters (SKOOG) By arrangement

BIOCHEMISTRY

141. Biochemistry.—Lectures on carbohydrates, lipids, proteins, enzymes, digestion, absorption, intestinal putrefaction, on the general aspects of metabolism, and on the composition and function of blood and urine. Prerequisites: Chemistry 121 and 123, or equivalents.
3 units, autumn quarter (LORING) TThS 8

142. Biochemistry.—A laboratory course which, for medical students, will include the following: pH and buffers; qualitative chemistry of the carbohydrates, lipids, and proteins; enzyme reactions and digestion; the composition and properties of milk, blood, and urine. For nonmedical students the second half of the quarter will be devoted to group experiments, quantitative in character, on living organisms. Prerequisites: Chemistry 110 and 111 (or 112 and 113); 121 and 123 (or equivalents).
2 units, autumn quarter MT 1–4 (GRIFFIN) (Medical students only)
ThF 1–4 (LUCK) (Nonmedical students only)

143. Biochemistry.—Continuation of Course 141, with particular reference to the chemistry and function of vitamins and hormones, to intermediary carbohydrate, lipid, and protein metabolism, to nutrition, and to the chemistry of antibiotics.
3 units, winter quarter (LORING) TThS 8

144. Biochemistry.—Medical students: a continuation of Course 142, with emphasis on the quantitative analysis of blood and urine by colorimetric and photometric procedures. Nonmedical students: assigned or selected experimental projects for small groups of students. These projects, pertaining to various fields of biochemistry are designed to introduce the student to use of the periodical literature in biochemistry, the design of experiments, and the methods employed in biochemical investigation.
2 units, winter quarter MT 1–4 (GRIFFIN) (Medical students only)
ThF 1–4 (LUCK) (Nonmedical students only)

145. Biochemistry.—A series of lectures on the dynamics of enzyme reactions. The course will also include recent developments in intermediary carbohydrate and lipid metabolism, in the biochemical aspects of hypertension, and other selected topics from the current biochemical literature. Prerequisites: Chemistry 141 and 143.
3 units, spring quarter (GRIFFIN) MWF 10

241. Amino Acids and Peptides.—A course of lectures on the chemistry and metabolism of the naturally occurring amino acids and simple peptides. Primarily for graduates in chemistry. Enrollment by permission.
3 units, spring quarter (LUCK) MWF 11
[In alternate years; given in 1954–55]

243. Proteins.—A course of lectures on the isolation, characterization, and properties of proteins. Primarily for graduates in chemistry. Enrollment by permission.
3 units, spring quarter (LUCK) MWF 11
[In alternate years; not given in 1954–55]

245. Biochemistry of Cancer.—A series of lectures covering the recent advances made in biochemical cancer research and including a discussion of methods used in producing experimental cancer, enzymatic, dietary, and nutritional studies, and other aspects of oncology.
2 units, winter quarter (GRIFFIN) MW 8

246. Nucleoproteins and Nucleic Acids.—A course of lectures on the preparation and properties of certain nucleoproteins and on the chemistry and metabolism of ribo- and desoxyribonucleic acids. Primarily for graduate students in chemistry.
2 units, spring quarter (LORING) TTh 9
[In alternate years; given in 1954–55]

247. Biochemistry of Water-Soluble Vitamins.—A course of lectures on the chemistry and functions of the water-soluble vitamins. (Primarily for graduate students in chemistry.)
2 units, spring quarter (LORING) TTh 9
[In alternate years; not given in 1954–55]

248. Biochemistry Seminar.—This course may be repeated for credit.
1 unit, autumn, winter, and spring quarters (STAFF) F 4

CHEMICAL ENGINEERING

161. Inorganic Chemical Technology.—A study of the chemistry and technology practiced in the commercial manufacture of the more widely used inorganic chemicals. Prerequisite: Chemistry 20.
3 units, spring quarter (———) TThS 9

167. Industrial Chemical Calculations.—A course in the applications of mathematics and fundamental principles of chemistry and physics to the solution of problems in industrial chemistry.
3 units, winter quarter (———) MWF 10

169. Thermodynamics for Chemical Engineers.—A study of the aspects of thermodynamics that are of particular concern in the adapting of chemical reactions to large-scale operations. Prerequisite: Chemistry 175.
3 units, autumn quarter (PAXTON) TThS 10

183. Principles of Chemical Engineering.—This, together with Courses 184, 185, 186, and 187, is designed to acquaint the student with the processes and problems involved in adapting chemical reactions to large-scale operations. This course takes up the unit operations of fluid flow, filtration, and heat transfer. Prerequisites: Mechanical Engineering 132 (or Chemistry 169) and Chemistry 175. Concurrent registration allowed.
5 units, autumn quarter (———) MTWThF 9

184. Chemical Engineering Laboratory.—Laboratory course designed to give practice in the unit operations discussed in Course 183. Prerequisite: Chemistry 176, 183.
4 units, winter quarter (PAXTON) TTh 1–6

185. Principles of Chemical Engineering.—Continuation of Course 183, with special attention to extraction and absorption.
3 units, winter quarter (———) MWF 9

186. Chemical Engineering Laboratory. — Laboratory course to follow Course 185.
3 units, spring quarter (PAXTON) T 1–6, Th 1–4

187. Principles of Chemical Engineering.—Continuation of Course 185, with special attention to distillation and drying.
3 units, spring quarter (———) TThS 10

251. Advanced Unit Operations.—A critical study of recent developments in an assigned field. Prerequisite: Chemistry 186.
2 or more units, autumn, winter, and spring quarters (PAXTON, ———)
By arrangement

253. Adsorption and Ion Exchange.—A lecture course considering equilibria, rate of transfer in, and design of apparatus for adsorption and ion exchange operations. Prerequisite: Chemistry 175.
2 units, winter quarter (HIESTER) TTh 9
[In alternate years; not given in 1954–55]

255. Distillation.—A lecture course considering vapor-liquid equilibria, two component and multicomponent rectification, and extractive distillation. Prerequisite: Chemistry 185.
2 units, spring quarter (GORDON) TTh 8
[In alternate years; not given in 1954–55]

259. Chemical Engineering Design Methods.—A lecture and computation course intended to integrate the student's earlier training in mathematics, physics, chemistry, thermodynamics, and engineering for the purpose of solving a few typical comprehensive problems leading to the design of chemical process plant and equipment. Prerequisite: Chemistry 187.
5 units, autumn quarter (LUNDE) MWF 9

272. Electrical Aids to Experimental Research.—The practical application of principles of electrical measurement and control to instrumentation problems connected with chemical research and chemical engineering operations.
2 units, winter quarter (GRINNELL) MW 11

274. Electronic Aids to Experimental Research. — Continuation of Course 272. Prerequisite: Chemistry 172, or consent of instructor.
2 units, spring quarter (GRINNELL) MW 11

ORGANIC CHEMISTRY

120. Organic Chemistry.—Lectures on the chemistry of aliphatic and aromatic compounds. For students other than chemistry majors. Prerequisite: Chemistry 3.
5 units, summer quarter (NOLLER) MTWThFS 9

121. Organic Chemistry.—Lectures on the chemistry of carbon compounds. Prerequisite: Chemistry 3.
3 units, autumn quarter (BONNER) MWF 11

122. Organic Preparations.—Offered for students in biology, chemistry, and medicine. Prerequisites: Chemistry 121 and 123 concurrently.
3 units, winter quarter (NOLLER) MT 1–5, WTh 1–5, F 1–5, and S 9–12

123. Organic Chemistry.—Continuation of Chemistry 121.
3 units, winter quarter (BONNER) MWF 9

124. Organic Preparations.—Continuation of Chemistry 122. Prerequisite: Chemistry 122.
3 units, spring quarter (BONNER) MWF 1–4

125. Organic Chemistry.—Continuation of Chemistry 123.
3 units, spring quarter (BONNER) MWF 11

126. Qualitative Organic Analysis.—Prerequisites: Chemistry 122 and 125.
3 units, autumn quarter (NOLLER) MWF 1–4

221. Advanced Organic Chemistry.—Lectures on advanced organic reactions, stereochemistry, heterocyclic compounds, and natural products. Prerequisite: Chemistry 125.
3 units, autumn quarter (MOSHER) MWF 9

223. Advanced Organic Chemistry.—Continuation of Chemistry 221.
3 units, winter quarter (MOSHER) MWF 9

225. Advanced Organic Chemistry.—Continuation of Chemistry 223.
3 units, spring quarter (MOSHER) MWF 9

227. Theoretical Organic Chemistry.—A course devoted to the interpretation of the properties and reactions of organic compounds on the basis of organic chemical theory. Prerequisites: Chemistry 221, 223, and 225 concurrently.
3 units, spring quarter (EASTMAN) MWF 10

229. Selected Topics in Theoretical Organic Chemistry.—Prerequisites: Chemistry 227, or equivalent, differential and integral calculus.
2 units, autumn quarter (EASTMAN) WF 10
[In alternate years; given in 1954–55]

240. Organic Chemistry Seminar.—This course may be repeated for credit.
1 unit, autumn, winter, and spring quarters (STAFF) M 4

PHYSICAL CHEMISTRY

171. Physical Chemistry.—Lecture and problem course dealing with the elements of physical chemistry. Prerequisites: Chemistry 110 or 112, 121, Physics 51, 53, 55, 57 (or equivalent), and Mathematics 10, 11, 21, and 22 (or equivalent).
3 units, autumn quarter (PARKS) MWF 8

173. Physical Chemistry. — Continuation of Chemistry 171, with special emphasis upon the application of thermodynamics to chemistry.
3 units, winter quarter (PARKS) MWF 8

175. Physical Chemistry.—Continuation of Chemistry 173, dealing especially with chemical kinetics and electrochemistry.
3 units, spring quarter (PARKS) MWF 8

176. Physico-chemical Measurements.—Prerequisites: Chemistry 110 or 112, and Physics 23 and 24, or 55. Concurrent or previous enrollment in Chemistry 175 required.
3 units, spring quarter (HUTCHINSON) TTh 1-5

177. Surface Chemistry.—A descriptive lecture course dealing with the physics and chemistry of surfaces of various types, such as liquid-gas, liquid-liquid, solid-liquid surfaces, .etc., and with the properties of films formed at such surfaces.
2 units, autumn quarter (HUTCHINSON) TTh 8
[In alternate years; given in 1954–55]

179. Surface Chemistry.—A descriptive course dealing with the applications of the knowledge of surfaces and surface films to such problems as the stability of colloids and heterogeneous catalysis.
2 units, winter quarter (HUTCHINSON) TTh 8
[In alternate years; given in 1954–55]

271. Chemical Kinetics.—A survey of experimental methods of study of reaction velocity, fitting of rate expressions, and determination of reaction mechanism. Systems treated will include homogeneous reactions in gas phase and dilute liquid solutions, and heterogeneous reactions at gas-solid interfaces. Prerequisite: Chemistry 175. (In special cases concurrent registration with Chemistry 171 may be allowed.)
3 units, autumn quarter (OGG) MWF 9
[In alternate years; not given in 1954–55]

283. Atomic and Molecular Structure.—Survey of modern theories of atomic and molecular structure, with particular reference to the origin and classification of spectra and the relation of structure to chemical properties.
3 units, winter quarter (OGG) MWF 11
[In alternate years; given in 1954–55]

285. Atomic and Molecular Structure.—Continuation of Chemistry 283 with reference to electric and magnetic susceptibility and to diffraction of x-rays and electrons.
2 units, spring quarter (OGG) MW 11
[In alternate years; given in 1954–55]

289a. Chemical Thermodynamics.—A systematic exposition of thermodynamics from the Gibbsian point of view. The principal topics are: fundamental concepts, Gibbsian equations, general conditions for chemical equilibrium, phase rule, systematic deduction of thermodynamic formulas, monovariant systems, azeotropic systems, perfect gases, absolute temperature, imperfect gases, ideal solutions, law of mass action. Lectures and problems.
3 units, autumn quarter (KOENIG) TThS 8
[In alternate years; given in 1954–55]

289b. Chemical Thermodynamics.—Continuation of Course 289*a*. Nonideal solutions, systematic deduction of the thermodynamic solution laws, chemical affinity and standard free energy, charged components, electrochemical potential, electric potential, electromotive force, galvanic cells, without liquid junction.
3 units, winter quarter (KOENIG) TThS 8
[In alternate years; given in 1954–55]

289c. Chemical Thermodynamics.—Continuation of Course 289*b*. Galvanic cells with liquid junction, glass electrode, pH, gravitational field, radiation, surface layers, Debye-Hückel theory.
3 units, spring quarter (KOENIG) TThS 8
[In alternate years; given in 1954–55]

291. Introduction to Quantum Mechanics.—An exposition of the principles of quantum mechanics with a view to their application to chemistry. Lectures and problems. Prerequisite: Previous or concurrent registration in Physics 111.
3 units, autumn quarter (OGG, JOHNSTON) MWF 10
[In alternate years; not given in 1954–55]

293a. Quantum Chemistry. — Applications of quantum mechanics to the problems of atomic and molecular structure, the chemical bond, and the periodic law. Prerequisite: Chemistry 291 or Physics 231. Lectures and problems.
2 units, winter quarter (OGG) MW 10
[In alternate years; not given in 1954–55]

293b. Quantum Chemistry.—Continuation of Course 293*a*.
2 units, spring quarter (OGG) MW 10
[In alternate years; not given in 1954–55]

297. Physical Chemistry Seminar. — Recent publications from chemical journals are reviewed. This course may be repeated for credit.
1 unit, autumn, winter, and spring quarters (STAFF) M 4

371. Chemical Kinetics. — The theory of gas-phase reactions of simple molecules, including sum-over-state mechanisms, statistical theories of unimolecular reactions, and quantum theory of bimolecular activation. Prerequisite: Chemistry 291 or Physics 231.
3 units, winter quarter (JOHNSTON) MWF 9
[In alternate years; not given in 1954–55]

RESEARCH AND SPECIAL ADVANCED WORK

190. Introduction to Methods of Investigation.—For general character and scope, see under Course 200. Primarily for advanced undergraduates.
(DEPARTMENT STAFF) By arrangement

200. Research and Special Advanced Work.—Properly qualified students are encouraged to undertake work of research, or other advanced laboratory work along lines not covered by the courses already listed, under the direction of any member of the teaching staff with whom arrangement is made.

For all such research and special work, students will register for Course 200 (or Course 190 if in undergraduate standing), giving the name of the member of the staff under whom the work is carried on and the number of units agreed upon. Prerequisite for 190 or 200 in organic or biochemistry: Chemistry 126.
(DEPARTMENT STAFF) By arrangement

CLASSICS

HERMANN FERDINAND FRÄNKEL, RAYMOND DAVIS HARRIMAN, Professors Emeriti
HAZEL DOROTHY HANSEN, PHILIP WHALEY HARSH, LIONEL I. C. PEARSON, Professors
GERALD KENNETH GRESSETH, WILLIAM HARRIS, Instructors

The Department of Classics has for its aim the interpretation of the civilizations of Greece and Rome. It accepts as major students those who desire training in Greek and Latin as a preparation for graduate work, either in this University or elsewhere, or who wish to secure teachers' certificates in one or both of the classical languages, and also those who, without intending to specialize in Greek or in Latin, wish to make their work in the University conform to the traditional arts course. The student is free to take his major work in one or both languages, or in Greek Archaeology. In addition to courses in Greek and Latin, the department offers courses in linguistics, in ancient literature in translation, and in ancient philosophy, history, archaeology, and art, which are open, unless otherwise stated, to students in all departments of the University.

ADMISSION TO THE DEPARTMENT

Students will be accepted as majors who have (1) completed four years of high-school study in Latin or reached an equivalent standard as, for example, by satisfactorily completing Course L23, or (2) completed two years of high-school study in Greek or reached an equivalent standard as, for example, by satisfactorily completing Course G23. Students will be accepted as majors in Archaeology who meet either of the above requirements or have satisfactorily completed the Lower Division requirement in a foreign language.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

A student's complete program of study should be prepared in advance in consultation with a department adviser and approved by the department. Major students must register each quarter for at least one course in the major subject.

A. Major in Classics: Latin and Greek.—Fifteen units in Latin and 15 in Greek; in one language all units must be in advanced courses. Ten units in other courses related to their program, including at least one course in Roman history and one in Greek history. A satisfactory knowledge of the history of Greek and Latin literature.

B. Major in Classics: Latin or Greek.—Thirty units in advanced courses in Latin (or Greek). Six units in other courses related to their program, including one course in Roman history (if Greek major, Greek history). A satisfactory knowledge of the history of Latin literature (if Greek major, Greek literature).

C. Major in Classics: Archaeology.—Eighteen units (two years) in Greek. Twenty-two units in courses in archaeology. One course in Greek history.

HONORS AND GRADUATE HONORS PROGRAMS IN HUMANITIES

For acceptable majors in Classics, an Honors Program in Humanities is offered, a description of which will be found on pages 209–211 under Special Programs in Humanities.

The Department of Classics participates in the Graduate Honors Program in Humanities leading to the degree of Doctor of Philosophy. For a description of that program, and fellowships offered in connection with it, see pages 211–212.

TEACHER'S CERTIFICATE

Students who graduate as majors in Latin or Latin and Greek may be recommended by the department for the teacher's certificate, provided that they have taken the Teachers' Course (L 200). Students in other departments who wish to secure a teaching-major in Latin should consult some member of the department.

ADVANCED DEGREES

The department offers to graduate students courses leading to the degrees of Master of Arts and Doctor of Philosophy.

To obtain the Master's degree the candidate must have completed satisfactorily not less than three quarters of work in courses approved by the department. Students whose primary interest is in the Greek or Latin language and literature must have passed written examinations in translation from and into Greek (or Latin), and an oral examination in Greek history, literature, and grammar (or in Roman history, Latin literature, and Latin grammar), and have submitted a thesis indicating ability to make use of sources. In the case of candidates whose advanced courses have included work in both Greek and Latin, the examinations will include questions in both fields.

Students whose primary interest is in archaeology or ancient history must have passed a written examination in translation from Greek (or Latin), and an oral examination in archaeology and Greek (or Roman) history, and have submitted a thesis indicating ability to make use of sources.

Intending candidates for the Doctor's degree will consult the University regulations defining the requirements—minimum time devoted to graduate study, residence, ability to read French and German, oral examination, and dissertation. In the Department of Classics, no student will be permitted to apply for the oral examination until he has passed such tests of his knowledge of the field and general fitness for research as the department may see fit to impose.

I. GREEK

FIRST- AND SECOND-YEAR COURSES

The language requirement of the University Lower Division may be met by completing the third course of the second year. Students may complete the work of the first year by taking either G1, 2, and 3, or G1*a* and 2*a*.

G1. First-Year Greek.—For beginners.
3 units, autumn quarter (———) **MWF 10**

G2. First-Year Greek.—A continuation of G1.
3 units, winter quarter (———) **MWF 10**

G3. First-Year Greek.—A continuation of G2.
3 units, spring quarter (———) **MWF 10**

G1a. First-Year Greek.—For beginners.
4 units, winter quarter (———) **MTWTh 10**

G2a. First-Year Greek.—A continuation of G1*a*.
5 units, spring quarter (———) **MTWThF 10**

G21. Second-Year Greek.—A continuation of G3 or 2*a*. Plato or Xenophon.
3 units, autumn quarter (———) **MWF 10**

G22. Second-Year Greek.—A continuation of G21. The *Iliad*.
3 units, winter quarter (———) **MWF 10**

G23. Second-Year Greek.—A continuation of G22. The *Odyssey*.
3 units, spring quarter (———) MWF 10

G28. New Testament.
1 or 2 units (———) By arrangement

MG1. Beginning Modern Greek.—Open to students who have taken G2 or G1a.
3 units, spring quarter By arrangement

THIRD-YEAR COURSES

G100. Introduction to Greek Tragedy.—One play of Euripides will be read.
3 units, autumn quarter (———) By arrangement

G101. Reading in Greek Poetry: (a) Tragedy, (b) Comedy.
3 units, winter quarter

G102. Reading in Greek Prose.—According to the needs of the student.
3 units, spring quarter

G105. Greek Prose Composition.—May be taken separately or in conjunction with a second or third-year course. This course may be repeated for credit.
2 units By arrangement

ADVANCED AND GRADUATE COURSES

For students who have completed two or more third-year courses, work at a more advanced level will be offered on an individual basis.

G113 or 213. Individual Work.—Reading in Greek suited to the needs of the individual. Work done in this way may include reading in Homer, Hesiod, the Greek lyric poets, Tragedy, Comedy, Hellenistic poetry, Herodotus, Thucydides, Xenophon, Plato, Aristotle, the Greek orators, and the New Testament.
1 to 3 units (STAFF) By arrangement

G205. Advanced Greek Prose Composition.—This course may be repeated for credit.
2 units

G298. Classical Bibliography.
1 or 2 units

G299. Thesis.

II. LATIN

The language requirement of the University Lower Division may be met by completing the third course of the second year. A placement test will be given to determine with which course a student should begin. It is generally expected that students who have taken two years of high-school Latin will be able to start with L21 and those with three years, with L22; students with four years of high-school Latin can complete requirements by taking L23 or one more advanced course.

FIRST- AND SECOND-YEAR COURSES

L1. First-Year Latin.—For beginners. (See also L5.)
3 units, autumn quarter (———) MWF 1

L2. First-Year Latin.—A continuation of L1.
3 units, winter quarter (———) MWF 1

L3. First-Year Latin.—A continuation of L2.
3 units, spring quarter (———) MWF 1

L5. Accelerated Course in Elementary Latin.—Intended especially for graduate students in other departments.
5 units, winter quarter (———) MTWThF 2

L20. Review of Grammar.—Not a required course, but recommended for students whose knowledge of grammar is insufficient; to be taken in conjunction with L21.
2 units, autumn quarter (———) TTh 1

L21. Second-Year Latin.—A continuation of L3 or equivalent. Cicero.
3 units, autumn quarter (———) MWF 1

L22. Second-Year Latin.—A continuation of L21 or equivalent. Vergil or Ovid.
3 units, autumn and winter quarters (———) MWF 1

L23. Second-Year Latin.—A continuation of L22 or equivalent. Vergil: selections from *Aeneid* VII–XII.
3 units, winter and spring quarters (———) MWF 1

L50. Reading in Latin Prose: Pliny or Seneca.
3 units, spring quarter (———) MWF 1

THIRD-YEAR COURSES

L100. Catullus.—A continuation of L23, or equivalent (four years of high-school Latin).
3 units, autumn quarter (———) MWF 9

L101. Terence.—One comedy will be read.
3 units, winter quarter (———) MWF 9

L102. Horace.—Selections from the *Odes* and *Epodes.*
3 units, spring quarter (———) MWF 9

L105. Latin Prose Composition.—May be taken separately or in conjunction with a second- or third-year course. May be repeated for credit.
2 units By arrangement

ADVANCED AND GRADUATE COURSES

One of the following will generally be offered each quarter, carrying 3 units or more.

L113 or 213. Individual Work.—Reading in Latin suited to the needs of the individual. Work done in this way may include reading in such authors as Seneca, Martial, Quintilian, and the early Christian fathers.

L150. Latin Comedy: (a) Plautus, (b) Terence.

L151. Lucretius.

L152. Vergil: (a) *Eclogues* and *Georgics,* (b) *Aeneid.*

L153. Latin Poetry of the Empire: (a) Satire, (b) Elegy.

L154. Cicero: (a) Orations, (b) Letters, (c) Philosophical Works.

L155. Roman Historians: (a) Caesar, (b) Sallust, (c) Livy, (d) Tacitus.

L156. Latin Prose of the Empire: (a) Petronius, (b) Apuleius.

L157. Senior Reading Course: *The Oxford Book of Latin Verse.*

L198. Medieval Latin.—Selected readings.

L200. Teachers' Course.—Lectures and conferences on methods of teaching Latin.

L205. Advanced Latin Prose Composition.—May be repeated for credit.

L299. Thesis.

[For Classical Bibliography see under Greek 298.]

III. LINGUISTICS

One or more of the following courses will be offered each quarter:

GL129. Greek and Latin Scientific Terminology.—Open to Upper Division students and (with permission) Lower Division students.
3 units, spring quarter (HARRIS)

GL130. Latin Word-Formation and English Derivation.—The course is intended for those who wish to increase their acquaintance and their understanding of both Latin and English vocabulary. Open to all students.
2 units, winter quarter (———)

GL131. Greek Word Formation and English Derivation.—The course is intended for those who wish to increase their acquaintance and their understanding of both Greek and English vocabulary. Open to all students.
2 units, spring quarter (———)

GL200. General Linguistics.—Principles of linguistic development, illustrated chiefly from Greek, Latin, English, and the Romance languages.
3 units, autumn quarter (HARRIS)

GL210. Historical Grammar of Greek and Latin.—Phonology and morphology.
3 units, spring quarter (———)

GL220. Vulgar Latin and Introduction to Romance Philology.—The phonology and morphology of Vulgar Latin; a study of Vulgar Latin texts of the sixth, seventh, and eighth centuries, showing the development of Latin into Romance, especially Spanish, French, and Italian.
3 units, winter quarter (———)

GL290. Sanskrit.—Elementary course.
3 units (HARRIS)

IV. GREEK AND ROMAN AUTHORS IN TRANSLATION

[Open to all students unless otherwise stated.]

One or more of the following courses will be offered each quarter:

[**World Literature and the History of Ideas: Classic Literature.**—See Humanities 61.]

T60. Homer.—The *Iliad* and *Odyssey* will be read and discussed. The discussion will be directed toward a fuller appreciation of epic poetry and an understanding of the civilization which it represents.
2 units (HANSEN, ———)

T73. Greek Tragedy: Euripides.—The most important plays will be studied. The relation of Euripides to the social, political, and intellectual movements of his day will be discussed.
2 units (HARSH)

T74. Greek Comedy: Aristophanes.—The eleven comedies will be studied. The origins of comedy and the structure and purpose of Aristophanic comedy will be discussed.
2 units (HARSH)

T75. Roman Drama.—Selected plays of Plautus, Terence, and Seneca will be studied. The positions of these writers in the history of drama, the significance of their plays, and their influence upon later authors will be discussed.
2 units (HARSH)

T81. Plato.—A number of dialogues will be studied and informally discussed in order to understand Plato's approach to the basic questions of human life and the answers which he proposes. No previous work in philosophy is required.
3 units (———) MWF 3

T83. Aristotle.—Aristotle's systematic thought and its influence on our own thinking will be studied from translations of his works. Some previous work in philosophy is desirable.
3 units (———) MWF 3

T85. Stoics and Epicureans.—The Stoic philosophy of self-control and self-salvation, and the Epicurean philosophy of enlightened contentment will be studied from translations of the original texts (Seneca, Epictetus, Marcus Aurelius, Epicurus, Lucretius). No previous work in philosophy is required.
3 units (———) MWF 3

T88. Greek and Roman Mythology.—A study will be made of classical mythology with special reference to its anthropological and ethico-religious aspects.
2 units, spring quarter (Gresseth)

V. ANCIENT HISTORY

The following three courses form a sequence, as a general survey of the Greek and Roman world, but they may be taken separately. Prerequisite: History 10, or equivalent.

H100. Greek History to the Death of Alexander the Great.—Lectures and assigned readings.
4 or 5 units, autumn quarter (Pearson) MTWTh 2

H101. The Roman Republic and its Hellenistic Background.—Lectures and assigned readings.
4 or 5 units, winter quarter (Pearson) MTWTh 2

H102. The Roman Empire.—Lectures and assigned readings.
4 or 5 units, spring quarter (Pearson) MTWTh 2

For more advanced students—especially for majors and graduate students in Classics or History—work will be offered on an individual basis.

H200. Independent Reading in Greek History.—Assigned readings, reports, and discussions.
3 or more units (Pearson) By arrangement

H205. Independent Reading in Roman History.
3 or more units (Pearson) By arrangement

VI. CLASSICAL ARCHAEOLOGY

[Open to all students unless otherwise stated.]

One or more of the following courses will be offered each quarter:

A100. Introduction to Archaeology.—Illustrated lectures on the various branches of archaeology, with special emphasis upon the processes of discovery and the methods by which our present knowledge of ancient civilization has been acquired.
3 units, autumn quarter (Hansen) MWF 11

A110. Homeric Archaeology.—This course is designed to present a picture of Homeric civilization. A detailed study of several sites in the Aegean area will be made.
3 units (Hansen)

A120. Introduction to Greek Art.—A study of the evolution of art in classical Greek lands and interpretation of works of art, chiefly sculpture.
3 units, winter quarter (Hansen) MWF 11

A125. Early Greek Art.—Lectures on the art from Cretan and Mycenaean sites.
3 units (Hansen)

A130. Later Greek Art.—Illustrated lectures on the art of the Hellenistic World.
3 units (HANSEN)

A160. Archaeological Laboratory.—Open to qualified students with the permission of the instructor. Practical work in the study and classification of archaeological material. The Stanford Museum has a collection of several thousand objects from Greece, including vases, coins, figurines, lamps, etc., which afford excellent material for study.
2 or 3 units, winter and *spring quarters M or Th 1-4

ECONOMICS

THEODORE HARDING BOGGS, JOHN BENNET CANNING, ELIOT JONES, ALBERT CONSER WHITAKER, Professors Emeriti

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MOSES ABRAMOVITZ, KENNETH J. ARROW, PAUL ALEXANDER BARAN, ELMER DANIEL FAGAN, BERNARD FRANCIS HALEY, MELVIN WARREN REDER, TIBOR SCITOVSKY, EDWARD STONE SHAW, LORIE TARSHIS, Professors
SHINZO KAJI, Visiting Professor
MERRILL KELLEY BENNETT, KARL BRANDT, HELEN CHERINGTON FARNSWORTH, WILLIAM ORVILLE JONES, VERNON D. WICKIZER, HOLBROOK WORKING, Professors, Food Research Institute
PETTER JAKOB BJERVE, Visiting Associate Professor
HENDRIK S. HOUTHAKKER, Acting Associate Professor
E. LOUISE PEFFER, BORIS C. SWERLING, Associate Professors, Food Research Institute
HOLLIS B. CHENERY, RALPH FRANKLIN HARRIS, GIDEON ROSENBLUTH, Assistant Professors
JULIUS MARGOLIS, Acting Assistant Professor
ALAN CERF, Instructor

NATURE AND PURPOSE

The purpose of instruction is to acquaint students with the economic aspects of modern society, to familiarize them with techniques for the analysis of contemporary economic problems, and to develop in them an ability to exercise sound judgment in evaluating public policy. The student also has the opportunity for training preparatory to a career in civil service, private enterprise, teaching, or research.

LIBRARY

The University Library is well supplied with literature in all fields of economics. In the Hopkins Transportation Library there is invaluable material on a variety of transportation problems. The extensive collection of governmental publications and documents affords ample opportunity for investigation of public policy in all phases of economic activity. There are special collections of works on the institutions and commerce of Latin America and the Orient as well as on the development of the Pacific Coast. Advanced students in economics have access to the Hoover Library on War, Revolution, and Peace, with its comprehensive collections of original and secondary materials.

FOOD RESEARCH INSTITUTE

Qualified graduate students in economics are given the opportunity for training and research in the special fields of the Food Research Institute. In addition, a few courses are conducted for undergraduates. Courses offered by the Institute count toward the completion of requirements for degrees in economics.

BACHELOR OF ARTS

Enrollment in the Department.—Students may enroll in the department as majors in economics if they meet one of the following requirements:

1. Completion of Elementary Economics at Stanford with an average grade of C or better.

2. Completion of a course in Elementary Economics, with an average grade of C or better, at some other institution, and successful performance in a written examination on this subject by the student in his first quarter of residence at Stanford. This examination will be given by the department each quarter, one week after registration day. If the examination is not passed, the student may fulfill requirement (1), receiving full credit and grade points.

Upper Division students who have not satisfied one of the two requirements above may be accepted provisionally as majors.

Graduation.—The student is urged to select his program of study carefully, with a view to his own special needs and interests. His departmental or divisional adviser will be prepared to advise him on his program at any time.

To be recommended by the department for the degree of Bachelor of Arts in economics, the student must have satisfied the following requirements:

1. Completion of 55 units in courses in economics and the curriculum of the Food Research Institute.

a) Economics 1 and 2, or their equivalent, shall be included in the 55 units.

b) Economics 100 or 110, or their equivalent, shall be included in the 55 units.

c) Three Upper Division courses in one of the groups A to K listed on pages 154–157 or in the curriculum of the Food Research Institute shall be included in the 55 units. One of the courses taken in satisfaction of this requirement may be selected from the collateral courses that are listed in connection with the group the student selects.

d) There shall be included in the 55 units at least one Upper Division course in economics from each of two groups other than the group chosen under (*c*) for specialization.

e) Economics courses taken at other universities may be included in the 55 units. It is required that a minimum grade of C shall have been received in each course. The Director of Undergraduate Study of the department will establish the amount of credit to be granted toward completion of the departmental requirements.

f) Statistics 50 may be included in the 55 units by students who complete successfully Economics 170.

g) A minimum of 20 units in Upper Division courses taken at Stanford shall be included in the 55 units.

2. An average grade of C or better shall have been received for all course units completed at Stanford in economics or the curriculum of the Food Research Institute.

3. Completion of a program, approved by his advisers, of at least 25 units of Upper Division courses in one or more of the following subjects: business law, cultural anthropology, history, industrial engineering, mathematics (including differential and integral calculus), mathematical statistics, philosophy, political science, psychology, and sociology.

Senior majors in economics whose departmental grade average is B or higher are urged to apply for enrollment in the senior seminar, Economics 199. This course is designed to give experience in independent research.

Students who are preparing for professional careers as economists, statisticians, or accountants are advised to register for courses in mathematics through elementary differential and integral calculus.

Courses offered by the Food Research Institute are listed on page 94.

ADVANCED DEGREES

The members of the Department of Economics, with the assistance of certain members of allied departments, undertake to supervise a wide range of individual advanced study and research to supplement instruction that is offered in courses listed below. All candidates for advanced degrees are urged to schedule with department advisers as early as possible their entire program of study.

The following statement of requirements for advanced degrees is supplementary to the general requirements of the University which deal with such matters as residence, dissertation, and examinations.

MASTER OF ARTS

Admission to Candidacy.—Completion of the Stanford requirements for a Bachelor of Arts degree in economics, or an equivalent training, is required of students who undertake a program of study for the degree of Master of Arts in economics. Provisional enrollment of graduate students may be permitted, however, in cases in which the previous training has been deficient, with the understanding that the deficiency will be remedied in advance of departmental approval of candidacy. Admission to candidacy for the degree will be restricted to students whose record bears promise of successful graduate work.

Recommendation for the Degree.—To be recommended to the Committee on Graduate Study for the degree of Master of Arts in economics, the student must have satisfied the following requirements:

1. Completion of a program of study at Stanford amounting to not less than 45 units of credit. No courses numbered below 100 and no courses completed with a grade less than C may be counted toward the 45 units required. Ordinarily the program will include at least 30 units in economics, of which at least 10 units (in addition to the thesis) must be in graduate courses. Courses in subjects closely related to economics may be included with the approval of the Director of Graduate Study in Economics.
2. Completion of a thesis acceptable to the department. Credit will be allowed for the thesis to a maximum of 9 units toward the 45 units required for the degree.
3. An average grade of B or better shall have been received for the entire program of study that has been approved by the department.

DOCTOR OF PHILOSOPHY

Admission to Candidacy.—The Director of Graduate Study in Economics will recommend the student to the Committee on Graduate Study for admission to candidacy for the degree of Doctor of Philosophy in economics when the conditions listed below have been satisfied.

1. The departmental committee on graduate study must have certified that the student is qualified to pursue a program of study for the degree. The committee will base its judgment in part on a departmental oral examination

and in part on the student's achievement in other aspects of his graduate work. Except in special circumstances, the oral examination must be taken in the third quarter of graduate study.

2. Completion of the University foreign-language requirement for the degree. The student is required to demonstrate to appropriate examiners a reading knowledge of two languages in addition to English, for one of which he may substitute a coherent program of study of 15 or more quarter-units of courses taken as a graduate student in a field external to economics (and to the minor subject if one is offered) such as, for example, mathematics (including differential and integral calculus). It is recommended that the student offer a program of mathematics in place of the second language. The language or languages selected and the substitute program, if any, shall be chosen so as to be most useful in connection with the student's program of study for the degree and his predoctoral and postdoctoral research program.

Recommendation for the Degree.—To be recommended to the Committee on Graduate Study for the degree of Doctor of Philosophy in economics, the candidate must have met the following requirements:

1. Completion of the following core program: Economics 201, 202, 203, 204, 210, 211, 212, 215, 216, 270, and 271, or the possession of equivalent knowledge as evidenced by passing the final examination in those courses.
2. A knowledge of accountancy equivalent to that obtainable from Economics 290.
3. Completion of course work at the 200 level for two fields of the student's choice, other than those included in the previous list, in economics or food research; or completion of such course work in one field, and either an approved program of 20 units of Upper Division and graduate courses in subjects other than economics or a minor subject.
4. Demonstration, in comprehensive written examinations in Price and Allocation Theory, Money, Income, and Employment, and the additional fields chosen according to the preceding paragraph, of a standard of achievement commensurate with the course requirements.
5. Participation in three seminars at the 300 level, and preparation of seminar papers deemed satisfactory for doctoral candidates.
6. Satisfactory performance in a University oral examination based upon the same fields as the written examinations.
7. Satisfactory completion of a doctoral dissertation.

The comprehensive written examinations in the candidate's fields in economics will be arranged by the Director of Graduate Study of the department. The candidate has the option of taking the entire series of examinations within any one quarter or of dividing the series in two parts, the first of which shall include Price and Allocation Theory and Money, Income, and Employment. Under the latter option, the second group of examinations may be deferred either one or two quarters. These written examinations must be passed satisfactorily before the candidate may be certified for the University oral examination. These examinations will be offered within the first seven weeks of the autumn, winter, and spring quarters. The Director will nominate examiners for the various fields from qualified personnel available to the department.

Examinations for the Ph.D. degree usually will not be given during the summer quarter. If suitable examining committees are available, an exception will be made for candidates who are unable to be at Stanford during the remainder of the year.

Minor for the Degree of Doctor of Philosophy.—The applicant for admission to candidacy for the degree of Doctor of Philosophy with economics as the minor subject will be expected to demonstrate that he is qualified to pursue advanced studies in the subject. Normally in the third quarter of graduate work in economics he will be subject to a departmental oral examination. On the basis of this examination and other evidence the departmental committee on graduate study will rule on his qualifications.

To be recommended for the degree of Doctor of Philosophy with economics as the minor subject, the student must have completed Economics 202, 203, 204, 210, 211, 212, 215, and 216 and have satisfactorily passed the departmental written examinations in Price and Allocation Theory and Money, Income, and Employment. He will then be recommended to the Committee on Graduate Study for admission to the University oral examination.

TEACHING ASSISTANTSHIPS

The department nominates a number of graduate students for appointment as teaching assistants. The stipend is $300 per quarter, and appointments may be made for one or more quarters of the academic year. The service expected consists of conducting sections of an elementary course during each quarter. Experience shows that able and well-prepared students can carry on this instruction and, at the same time, pursue satisfactorily graduate work on their own account. Applicants for these appointments for an ensuing year should address their requests to the Executive Head of the department not later than February 15. The applications should be accompanied by a complete, authenticated transcript of the academic record (graduate and undergraduate). There should be at least three letters of recommendation from persons qualified to speak of the applicant's fitness for appointment.

The attention of prospective graduate students is also directed to the fact that applications for graduate fellowships should be addressed to the Committee on Graduate Study and should be filed by February 15.

[Note.—Classes scheduled to meet five times a week will meet on Fridays only for examinations or at the discretion of the instructor. The time will ordinarily be devoted to additional outside reading or other work.]

COURSES OPEN TO LOWER DIVISION STUDENTS

[Freshmen may enroll in Economics 90, 91.]

1, 2. Elementary Economics.—Introduction to the study of economics. Prerequisite: second-year standing.

1.	5 units, autumn quarter	(Fagan, Shaw, Tarshis)	MTWThF 9, 12, 2
	5 units, *winter quarter	(Fagan, Cerf)	MTWThF 9, 12
	5 units, *spring quarter	(Haley)	MTWThF 2
	4 units, *summer quarter	(Reder)	MTWThF 9
2.	5 units, autumn quarter	(Baran)	MTWThF 9
	5 units, *winter quarter	(Haley, Abramovitz, Margolis)	MTWThF 9, 12, 2
	5 units, *spring quarter	(Abramovitz, Margolis)	MTWThF 9, 12
	4 units, *summer quarter	(———)	MTWThF 8

90, 91. Elements of Accounts.—The theory and practice of enterprise accounting. (Students who have taken or are taking a University course in elementary accounting are admitted to this course only by special permission of the instructor.)

90.	5 units, autumn quarter	(Cerf)	MTWThF 10
	5 units, *winter quarter	(Harris)	MTWThF 8
91.	5 units, winter quarter	(Cerf)	MTWThF 10
	5 units, *spring quarter	(Cerf)	MTWThF 8

COURSES OPEN TO UPPER DIVISION STUDENTS

[Note.—Courses numbered 101–195 are for Upper Division students primarily but are open to Lower Division students by consent of the instructor. Courses numbered 196–199 are exclusively for selected senior majors in economics. Courses numbered 200–299 are for graduate students primarily but are open to Upper Division students by consent of the instructor.]

T83. Aristotle.—Aristotle's systematic thought and its influence on our own thinking will be studied from translations of his works. Some previous work in philosophy is desirable.
3 units (———) MWF 3

T85. Stoics and Epicureans.—The Stoic philosophy of self-control and self-salvation, and the Epicurean philosophy of enlightened contentment will be studied from translations of the original texts (Seneca, Epictetus, Marcus Aurelius, Epicurus, Lucretius). No previous work in philosophy is required.
3 units (———) MWF 3

T88. Greek and Roman Mythology.—A study will be made of classical mythology with special reference to its anthropological and ethico-religious aspects.
2 units, spring quarter (GRESSETH)

V. ANCIENT HISTORY

The following three courses form a sequence, as a general survey of the Greek and Roman world, but they may be taken separately. Prerequisite: History 10, or equivalent.

H100. Greek History to the Death of Alexander the Great.—Lectures and assigned readings.
4 or 5 units, autumn quarter (PEARSON) MTWTh 2

H101. The Roman Republic and its Hellenistic Background.—Lectures and assigned readings.
4 or 5 units, winter quarter (PEARSON) MTWTh 2

H102. The Roman Empire.—Lectures and assigned readings.
4 or 5 units, spring quarter (PEARSON) MTWTh 2

For more advanced students—especially for majors and graduate students in Classics or History—work will be offered on an individual basis.

H200. Independent Reading in Greek History.—Assigned readings, reports, and discussions.
3 or more units (PEARSON) By arrangement

H205. Independent Reading in Roman History.
3 or more units (PEARSON) By arrangement

VI. CLASSICAL ARCHAEOLOGY

[Open to all students unless otherwise stated.]

One or more of the following courses will be offered each quarter:

A100. Introduction to Archaeology.—Illustrated lectures on the various branches of archaeology, with special emphasis upon the processes of discovery and the methods by which our present knowledge of ancient civilization has been acquired.
3 units, autumn quarter (HANSEN) MWF 11

A110. Homeric Archaeology.—This course is designed to present a picture of Homeric civilization. A detailed study of several sites in the Aegean area will be made.
3 units (HANSEN)

A120. Introduction to Greek Art.—A study of the evolution of art in classical Greek lands and interpretation of works of art, chiefly sculpture.
3 units, winter quarter (HANSEN) MWF 11

A125. Early Greek Art.—Lectures on the art from Cretan and Mycenaean sites.
3 units (HANSEN)

cluding the United States, Soviet Russia, and Great Britain. Prerequisites: Economics 1 and 2. Recommended: Economics 115 and 117.

5 units, autumn quarter (MARGOLIS) MTWThF 12

121. Theories of Economic Development.—Analysis of important doctrines of economic and social development: Laissez faire; New Deal; Marxism; Fabianism; Fascism; Thomism. Prerequisite: Economics 120, or consent of instructor.

5 units, winter quarter (BARAN) MTWThF 12

122. Economic Planning.—Intensive discussion of the theory and practice of economic planning. Prerequisites: Economics 120 and consent of instructor.

5 units, spring quarter (BARAN) MTWThF 11

[149. Comparative Labor Movements.]

[Collateral courses recommended in connection with this group: Economics 115 (Economic History of Europe), 117 (Economic History of the United States), 167 (Industrialization and Foreign Trade), 200 and 201 (History of Economic Thought), 202, 203, and 204 (Price and Allocation Theory); History 122 (American History since 1890), 123 (American Social History), 182 (The Russian Revolution); Political Science 122 (The British Empire), 126 (Government of the Soviet Union), 127 (Soviet Law and Planning).]

E. MONETARY THEORY AND PROBLEMS

125. Money and Finance.—A survey of the monetary and financial system: the central bank, other banks, security markets; the role of money and finance in the economic system. Prerequisites: Economics 1 and 110.

5 units, autumn quarter (SHAW) MTWThF 2
5 units, spring quarter (HARRIS) MTWThF 1

126. International Financial Problems.—Problems and policies of balancing international accounts; international monetary relations and institutions. Prerequisite: Economics 125 or 165.

5 units, spring quarter (SHAW) MTWThF 8

128. Monetary Policies.—A theoretical and historical study of experiments in monetary policy. Prerequisite: Economics 127.

3 units, winter quarter (SHAW) MTWThF 11

[Collateral courses recommended in connection with this group: Economics 112 (Business Cycles I), 122 (Economic Planning); Political Science 171 (Governmental Power and the American Constitution), 172 (The American Constitution and Economic Justice).]

F. PUBLIC FINANCE

141. Public Finance.—The history and theory of public expenditure, revenue, and borrowing, with emphasis upon the relation between public expenditure and the business cycle. Prerequisites: Economics 1 and 2.

5 units, autumn quarter (FAGAN) MTWThF 11
5 units, *spring quarter (FAGAN) MTWThF 11

142. Taxation.—The shifting, incidence, and economic effects of taxes imposed, or likely to be imposed, in the United States. Prerequisite: Economics 141.

5 units, winter quarter (FAGAN) MTWThF 11

[Collateral courses recommended in connection with this group: Economics 112 (Business Cycles I), 191 (Accounting), 122 (Economic Planning), 123 (Money and Finance), 126 (International Financial Problems), 128 (Monetary Policies); Philosophy 170 (Theory of Value), 172 (Types of Moral Philosophy), 178 (Political Philosophy); Political Science 101 (Administrative Procedure), 171 (Governmental Power and the American Constitution), 172 (The American Constitution and Economic Justice).]

G. LABOR PROBLEMS

145. Labor Problems.—A general survey course: factors that determine wages, conditions of work, and employment, including labor markets, productivity, labor organizations, and governmental action. Prerequisites: Economics 1 and 2.

5 units, winter quarter (REDER) MTWThF 9

146. Labor Markets.—The economic determinants of wages and employment. The impact of collective bargaining on wages, incomes, and employment. Prerequisites: Economics 1 and 2. Recommended: Economics 100 or 110.
5 units [Not given in 1954–55]

147. Collective Bargaining and Public Policy.—Objectives and tendencies of the labor movement; patterns and techniques of collective bargaining; public regulation of collective bargaining. Prerequisites: Economics 1 and 2. Recommended: Economics 100 and 110.
5 units, spring quarter (Reder) MTWThF 9

149. Comparative Labor Movements.—A comparative study of origins, development and policies of trade unions in various countries of the world. Prerequisites: Economics 1 and 2.
4 units, summer quarter (Reder) MTWThF 11

[Collateral courses recommended in connection with this group: Economics 112 (Business Cycles I), 115 (Economic History of Europe), 117 (Economic History of the United States), 121 (Theories of Economic Development), 125 (Money and Finance), 155 (Economics of Industry); Psychology 192 (Industrial Relations).]

H. Economics of Industry

155. Economics of Industry.—A survey of the nature of business firms and industries and of the problems which they present for public policy. Prerequisites: Economics 1 and 2. Students planning to take more than one course in this field are advised to begin with Economics 157.
5 units, autumn quarter (Rosenbluth) MTWThF 9

157. Organization of Industry. — Factors determining the structure and economic behavior of plants, firms, and industries. Prerequisites: Economics 1 and 2.
5 units, autumn quarter (Rosenbluth) MTWThF 11

158. Industrial Organization and Markets.—Types of business practices (monopoly, basing point pricing, market sharing, price leadership, etc.) and their implications for social policy. Prerequisite: Economics 155 or 157 (preferred).
5 units, winter quarter (Rosenbluth) MTWThF 9

159. Social Control of Industry.—The control of monopoly through antitrust legislation and other measures to make the economy more competitive. Prerequisite: Economics 158.
5 units, spring quarter (Tarshis) MTWThF 9

[Collateral courses recommended in connection with this group: Economics 100 (Value and Price), 112 (Business Cycles), 142 (Taxation), 190 (Accounting), 202 (Price and Allocation Theory), Law 101 (Business Law); Political Science 108 (Administrative Regulation); Industrial Engineering 100 (Industrial Organization and Management), 130 (Engineering Economy).]

I. International Trade and Finance

165. Introduction to International Economics.—Survey of mechanism, organization, effects and adjustments of international trade, monetary and real aspects. Prerequisites: Economics 1 and 2.
5 units, autumn quarter (Chenery) MTWThF 10
5 units, spring quarter (Houthakker) MTWThF 2

[126. International Financial Problems.]

167. Industrialization and Foreign Trade.—The history of protectionism, international capital movements and industrialization in its relation to current problems. Prerequisite: Economics 165.
5 units, winter quarter (Chenery) MTWThF 10

[Collateral courses recommended in connection with this group: Economics 112 (Business Cycles I), 115 (Economic History of Europe); Food Research 101 (The World's Food); Political Science 133 (Control of Foreign Policies in Major World Powers).]

J. ECONOMIC STATISTICS

170. Economic Statistics.—Statistical methods of special application to economic problems. Prerequisite: Statistics 50. Statistics 50 may be counted as a course in economics for students who complete Economics 170.
5 units, winter quarter (ROSENBLUTH) MTWThF 11

171. Introduction to Quantitative Analysis.—Major problems of quantitative research in economics and relevant sources of statistical information, including national economic accounting, input-output analysis, cost and demand studies, family budget surveys.
5 units, spring quarter (HOUTHAKKER) MTWThF 12

[Collateral courses recommended in connection with this group: Economics 190 and any Upper Division course in the Department of Statistics.]

K. ACCOUNTANCY

190. Accounting I.—Asset accounting. Prerequisite: Economics 91 or equivalent.
5 units, autumn quarter (HARRIS) MTWThF 10

191. Accounting II.—Studies of income and net worth accounting, mergers, consolidated statements. Prerequisite: Economics 190.
5 units, winter quarter (HARRIS) MTWThF 10

192. Accounting Analysis for Economic Decisions.—A study of the relevance and reliability of accounting data for management decisions. Prerequisites: Economics 191.
3 units, spring quarter (CERF) MTW 10

193. Seminar in Accountancy.—Analysis of selected problems. Prerequisite: consent of the instructor.
3 units, autumn quarter (CERF) MTW 8

[Collateral courses recommended in connection with this group: Economics 155 (Economics of Industry), 157 (Organization of Industry), 170 (Economic Statistics); Industrial Engineering 120 (Quality Control by Statistical Methods), 131 (Engineering Economy).

COURSES PRIMARILY FOR GRADUATE STUDENTS

A. PRICE AND ALLOCATION THEORY

200. English Classical Economics.—The doctrines of the English classical economists examined in relation to the most pressing economic problems of their day. The period receiving primary emphasis is 1776 to 1850, but the predecessors of Adam Smith are treated briefly.
5 units, autumn quarter (HALEY) MTWThF 1

201. Economic Thought since 1850.—The development of economic doctrine, principally in Western Europe and the United States, in modern times. May be taken independently of Economics 200.
5 units, winter quarter (HALEY) MTWThF 1

202. Price and Allocation Theory I.—Perfect competition. The meaning and conditions of efficiency in economic organization. Prerequisite: consent of the instructor.
5 units, autumn quarter (SCITOVSKY) MTWThF 11

203. Price and Allocation Theory II.—Different forms of competitive and monopolistic behavior and their effect on the efficiency of economic organization. Prerequisite: Economics 202.
5 units, winter quarter (SCITOVSKY) MTWThF 11

204. Price and Allocation Theory III.—The pricing of the factors of production. Prerequisite: Economics 203.
5 units, spring quarter (SCITOVSKY) MTWThF 12

205. Special Topics in Mathematical Economics.—The content of this course will vary from year to year but will stress the application of mathematical methods to economic problems.
5 units, autumn quarter (ARROW) MTWThF 2

301. Seminar in Price and Allocation Theory.—Prerequisites: Economics 204 and the consent of the instructor.
5 units, autumn quarter (HALEY) MTWThF 3

B. MONEY, INCOME, AND EMPLOYMENT

210, 211, 212. The Theory of Income and Economic Fluctuations.—The theory of money, employment, and income considered from the points of view of comparative statics, the causes of instability and long-term change.
210. 5 units, autumn quarter (ABRAMOVITZ) MTWThF 9
211. 5 units, winter quarter (TARSHIS) MTWThF 3
212. 5 units, spring quarter (HALEY) MTWThF 12

310. Seminar in Money, Income and Employment.—Prerequisites: Economics 212 and the consent of the instructor.
5 units, winter quarter (SHAW) By arrangement

C. ECONOMIC HISTORY AND COMPARATIVE SYSTEMS

215, 216. Economic Development.—An outline of the origins and development of modern capitalism and of other contemporary economic systems.
215. 5 units, autumn quarter (ABRAMOVITZ) MTWThF 11
216. 5 units, winter quarter (BARAN) MTWThF 2

315. Seminar in Economic Development and Comparative Systems.—Prerequisites: Economics 216 and the consent of the instructor.
5 units, spring quarter (BARAN) By arrangement

D. PUBLIC FINANCE

241. Seminar in Public Finance and Taxation.—Prerequisites: Economics 142 and the consent of the instructor.
3 units, spring quarter (FAGAN) MTW 9

341. Seminar in Public Finance.—Prerequisites: Economics 241 and the consent of the instructor.
5 units, autumn quarter (ARROW) By arrangement

E. LABOR PROBLEMS

245. History of the American Labor Movement.—Analytical topics are treated from the historical viewpoint. Special attention is paid to timing and growth of various unions, changes in leadership and objectives of American labor.
5 units, winter quarter (REDER) MTWThF 10

345. Seminar in Wage Theory.—Prerequisite: consent of the instructor.
5 units, spring quarter (REDER) By arrangement

F. ECONOMICS OF INDUSTRY

255. Economics of Industry.—Consideration of industrial organization and business practices and their regulation.
5 units, spring quarter (CHENERY) MTWThF 8

256. The Structure of Industry.—Detailed analysis of the structure of related industries; use of input-output analysis for study of interrelations.
5 units [Not given in 1954–55]

355. Seminar in Economics of Industry.—Prerequisite: Consent of the instructor.
3 units, spring quarter (ROSENBLUTH) By arrangement

G. INTERNATIONAL TRADE AND FINANCE

265. International Trade and Resource Allocation.—An analysis of the factors that underlie trade, and consideration of policies for regulating it.
5 units, autumn quarter (TARSHIS) MTWThF 12

266. International Economics and Income.—The significance of international transactions for the national income, and related questions.
5 units [Not given in 1954–55]

365. Seminar in International Trade and Finance.—Prerequisite: consent of the instructor.
5 units, winter quarter (SCITOVSKY) By arrangement

H. ECONOMIC STATISTICS

270. Statistical Analysis I.—Elementary probability theory, sampling, distributions. Prerequisite: a working knowledge of the calculus. (Same as Mathematics 123 and Statistics 116.)
4 units, autumn quarter (CHERNOFF) MTWF 9

271. Statistical Analysis II.—Statistical inference, regression analysis. Prerequisite: Economics 270. (Same as Statistics 118.)
5 units, winter quarter (ARROW) MTWThF 3

272. Quantitative Analysis in Economics.—Economic interdependence in relation to statistical analysis; problems of aggregation and use of cross-section data. Prerequisites: Economics 100, 110, 271.
5 units, spring quarter (ARROW) MTWThF 10

I. ACCOUNTANCY

290. Accounting and Economic Theory.—Analysis of the relationship of accounting theory and practice to economic theory. Prerequisite: Consent of the instructor.
5 units, spring quarter (HARRIS) MTWThF 3

ENGLISH

WILLIAM HAWLEY DAVIS, HENRY DAVID GRAY, ALBERT GUÉRARD, RICHARD FOSTER JONES, ARTHUR GARFIELD KENNEDY, EDITH RONALD MIRRIELEES, Professors Emeriti

VIRGIL K. WHITAKER, MARGERY BAILEY, JOHN WENDELL DODDS, HUBERT CROUSE HEFFNER (Dramatic Literature), WILLIAM IRVINE, FRANCIS RARICK JOHNSON, HERBERT DEAN MERITT, GEORGE FRANK SENSABAUGH, WALLACE EARLE STEGNER, ARTHUR YVOR WINTERS, Professors
BOGISLAV VON LINDHEIM, Visiting Professor (Winter Quarter)
ROBERT W. ACKERMAN, ALFRED H. GROMMON, JOHN LOFTIS, JOHN McCLELLAND, RICHARD PINGREE SCOWCROFT, Associate Professors
CHARLES A. ALLEN, NEWELL FORD, ROBERT G. HOOPES, WILFRED H. STONE, Assistant Professors
MALCOLM JAY GOLDSTEIN, MARGARET DILLE HUDSON, DAVID LEVIN, JAMES McNELIS, LAWRENCE V. RYAN, Instructors

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

I. Students who plan to major in English are urged to take the Lower Division courses in Shakespeare (English 25) and Introduction to

Poetry (English 76) as preparation for the more advanced required courses. Humanities 61 is also recommended.

II. All students majoring in English are required to take the following departmental courses:

English 102. Introduction to the English Language.
English 141. Chaucer.
English 143. Shakespeare.
English 182. English Literature of the Renaissance.
English 183. English Literature of the Restoration and Eighteenth Century.
English 184. English Literature of the Nineteenth Century.

The last three courses should be taken in sequence during the junior year. In addition to the courses listed above, the student must complete *one* of the following programs:

A. *English Literature*

[The student should have taken a course in English history, such as History 105, by the beginning of his junior year.]

1. One course from each of the following four groups:
   - *a*) English 142, 144.
   - *b*) English 145, 146.
   - *c*) English 148, 149, 151, 152.
   - *d*) English 140, 168, 237, 238, 241, 242, 251.
2. One of the following senior seminars: English 192, 193, 194.

B. *Creative Writing*

[All students wishing to major in creative writing must obtain the approval of the creative writing committee at the beginning of the junior year.]

1. Two courses from one of the following groups, and one course from the same group or from another:
   - *a*) English 142, 144, 145, 146, 148, 149, 151, 152.
   - *b*) English 177, 265, 266, 269.
   - *c*) English 171, 270, 292.
2. Completion of at least 12 units of work in one of the programs listed below:
   - *a*) *Fiction:* English 125, Prose Style, or 255, The Theory and Practice of the Criticism of Fiction; 202*a* and *b*, Short-Story Writing, and 203*a* and *b*, Advanced Fiction Writing.
   - *b*) *Poetry:* English 251, The English Lyric, and English 201, The Writing of Poetry, which may be repeated for a total of 8 units of credit. The student may at his discretion substitute English 252, The Theory and Practice of the Criticism of Poetry, for 4 units of English 201, or for English 251.
   - *c*) *Drama:* English 294 and 295; and 4 units to be determined by the Department of Speech and Drama with the approval of the English Department.
   - *d*) *Criticism:* Any three of the following courses: English 252, The Theory and Practice of the Criticism of Poetry; English 255, The Theory and Practice of the Criticism of Fiction; English 125, Prose Style; English 254, The Theory and Practice of the Criticism of the Drama. The student will be urged to take such courses in the history of criticism and in aesthetics as he can.

C. *American Literature*

1. English 177. American Literature of the Seventeenth and Eighteenth Centuries.
2. English 265. American Novelists.
3. English 266. Chief American Poets, from 1630 to the present.
4. English 269. The Rise of Realism in American Fiction.
5. Two additional courses from the following list: English 267, 270, 292.

III. In addition to the English major requirements, courses totaling not less than 16 units of college work must be taken in one of the following minor fields:

One foreign language and literature.
Philosophy and/or History.
Speech and Drama.
Music or Art (advanced courses).
Unified program to be arranged with the approval of the adviser and the department.
Humanities Honors Program. (The entire Honors Program must be taken to fulfill the minor requirement.)

HONORS PROGRAM IN HUMANITIES

An Honors Program in Humanities is offered for majors of this department who wish to supplement their departmental major by a related and carefully guided program of studies. See pages 209–211, under Special Programs in Humanities, for a description of the Honors Program.

TEACHERS' CREDENTIALS

Students wishing to obtain the Stanford General Secondary Credential entitling them to teach in grades 7–14 in the public schools of California, or a Junior College Credential for grades 13 and 14, should consult pages 32–33 and the credential secretary of the School of Education for the requirements.

Candidates for the Stanford General Secondary Credential with a teaching major in English are required to take the following departmental courses or their equivalents:

Teaching Major

English 2*a* and 2*b*. English Composition	6 units
English 102. Introduction to the English Language	4 units
English 143. Shakespeare	4 units
English 182. English Literature of the Renaissance	5 units
English 183. English Literature of the Restoration and Eighteenth Century	5 units
English 184. English Literature of the Nineteenth Century	5 units
Courses in American Literature (preferably in the chief American poets and American novelists)	8 units
Speech and Drama 163. Principles of Directing (3 units) *or* Journalism 50. Editorial Techniques (2 units) and Journalism 51. Introduction to Journalism (1 unit)	3 units
Electives (courses in literary criticism, speech, and radio are strongly recommended) to bring the total number of units to 54.	
	54 units

Graduate transfer students who are qualifying for a teaching major or minor in English should confer with Mr. Grommon before taking English 182, 183, or 184.

Teaching Minor

English 102. Introduction to the English Language	4 units
English 143. Shakespeare	4 units
English 184. English Literature of the Nineteenth Century	5 units
Courses in American Literature	8 units
Elective, preferably in the English novel	4 units
Education 284*a*. Curriculum and Instruction in Secondary English I	4 units
	29 units

The candidate who elects English as a teaching minor is urged to register for Education 284*a* (Methods of Teaching English) in the autumn quarter of his senior year.

All candidates for a Stanford credential with a teaching major in English are required to take at least three courses in the Stanford Department of English; for the teaching minor, two such courses are required.

Candidates for the Junior College Credential must meet the following requirements:

1. Completion of the Master's degree in English.
2. Completion of 18 quarter units in a teaching minor, 9 units of which are Upper Division or graduate units.
3. Completion of the following 15 quarter units of professional courses in education:
   a) Education 347, The Junior College (3 units), offered in autumn quarter by the School of Education.
   b) Education 248, Student Teaching in Junior College (9 units), offered by the Department of English.
   c) Education 289 (3 units), offered by the Department of English. This course consists of auditing Education 284*a*, Curriculum and Instruction in Secondary English I (offered *only* during the autumn quarter) and, during the quarters of student teaching, attending regular meetings of the staff teaching Freshman Composition and the departmental meetings of the candidates for the Junior College Credential.
4. Education 241, Introduction to Audio-Visual Education (3 or 4 units), offered by the School of Education in spring and summer quarters, is required by state law for renewal of the Junior College Credential after one year.

To be admitted to the program for the Junior College Credential, the candidate must apply to the Department of English well in advance of registration for the autumn quarter. The candidate must begin the program during the summer or autumn quarters. Because the graduate students in the program will either teach a section of Freshman Composition in the University or assist in teaching such a section, the Department of English will select only those applicants who, in the judgment of the department, meet the standards required of the members of the University's instructional staff and who seem to be promising candidates for an advanced degree offered by the Department of English. If the applicant's decision to attend Stanford depends upon his being admitted to this program in addition to his being accepted as a graduate student, he is urged to request an interview with the Executive Head of the Department of English and the other members of the selection committee. This interview should take place during the spring or summer quarters preceding the autumn quarter in which the candidate wishes to begin the program. It is the University's policy to limit the Junior College Credential to students who would be fully qualified to study for the Ph.D. degree, whether or not they plan to do so. Other graduate students who are interested in obtaining a teaching credential are advised to prepare themselves for teaching by qualifying for the Stanford General Secondary Credential.

ADVANCED DEGREES

Eligibility.—Anyone may enter upon graduate work at Stanford University, with the intention of becoming a candidate for a higher degree in English, who has received a Bachelor's degree from any college or university of accredited standing, and whose record is acceptable. However, students whose previous preparation falls short of the requirements for the degree of Bachelor of Arts in English at Stanford must expect to spend more than the minimum time in residence. The department reserves the right, moreover, to reject old credits for graduate work done either at Stanford or elsewhere. Any student planning to apply for an advanced degree in English should, unless he has very recently received a degree in English at Stanford, file with the department as early as possible a complete transcript of record showing the previous work done in English and allied fields of study.

Time of Residence.—Three quarters of full-time work at Stanford, or their equivalent, are required for the degree Master of Arts. The candidate must complete an approved program of work in courses consisting of a minimum of 36 units, and in addition submit an acceptable Master's thesis.

Three years of full-time work or their equivalent, including at least 90 units of course work beyond the Bachelor's degree, are the minimum required for the degree of Doctor of Philosophy. Of these, one full year, consisting of three consecutive quarters of course work beyond the first year of graduate study, must be at this University. Candidates not exceptionally well prepared should expect to spend more than the minimum period of three years in order to obtain the doctorate in English. Twelve or 13 units per quarter are regarded as constituting a normal amount of work. The nature of the courses selected will determine the number of courses which it will be advisable to choose.

Except under extraordinary circumstances, it is not possible to secure both the Stanford teaching credential and the degree of Master of Arts in one year of graduate study. The courses required in professional education, in the teaching major, and in the program for the Master's degree are too extensive to be completed within three quarters. But in some cases, where certain requirements of the School of Education have been met in advance, it has been found possible to secure the Master's degree by an additional quarter of study. The summer quarter may provide for such students the opportunity for securing both the Master's degree and the Stanford General Secondary or Junior College Credential.

Language Requirements.—A candidate for the degree of Master of Arts must have an elementary knowledge of Old English, which can be secured by electing the course in Old English while at Stanford, and a reading knowledge of one foreign language, which he will demonstrate by passing a two-hour written examination consisting of three passages: (1) poetry, (2) criticism, (3) fiction. No dictionaries will be allowed, but passages will be chosen which require a knowledge only of fairly common words. Examinations in all languages indicated by Master of Arts candidates will be given in the eighth week of each quarter at an hour and date to be announced.

A candidate for the degree of Doctor of Philosophy must have a reading knowledge of Latin, German, and French. In special cases another language may be substituted for German or French.

The following schedule for meeting foreign language requirements will apply to all candidates, whether for the A.M. or the Ph.D. degree. No graduate student will be allowed to register for his third quarter of work until one foreign language examination has been passed (given by the Department for the A.M.; given by the University Examiner for the Ph.D.). No Ph.D. candidate will be allowed to register for the fifth quarter of work until a second foreign language examination has been passed, and no Ph.D. candidate will be allowed to take the written comprehensives until all language requirements (two modern and Latin) have been satisfied.

Application for Candidacy.—Candidates for the degree of Master of Arts may concentrate in English Literature, American and English Literature, English Philology, or, with permission, Creative Writing. They must make out, in consultation with their major professor, an application for candidacy, and present it to the University Committee on Graduate Study during the first four weeks of the quarter preceding that in which the degree is to be granted. This application must include a list of courses taken and to be taken and a summary of the projected thesis.

Candidates for the degree of Doctor of Philosophy may concentrate in English Literature or English Philology. In addition to this concentration, a student must offer either a minor in a related department; or a supplementary program of at least 24 units of work in English Literature, English Philology, or American Literature; or a special program of studies related to the student's projected research.

Candidates for the degree of Doctor of Philosophy should file their application for candidacy during the year preceding that in which the degree is to be granted. This application includes the full program of the three years' study and the title of the dissertation. Candidates offering the supplementary program in American Literature may write their dissertation on a subject from American Literature; otherwise, the dissertation must be in the field of concentration.

Changes in the title of the thesis or dissertation or in the program of study may be made with the consent of the major professor and the approval of the Graduate Study Committee.

Thesis or Dissertation.—The Master's thesis may not be counted for more than 9 units of credit in addition to the required 36 units of work in courses. It must be presented in its finished form to the professor under whose direction it is written at least four weeks before the close of the quarter in which the degree is to be granted. Candidates wishing to substitute for the thesis a piece or pieces of imaginative writing may do so upon satisfying the members of the Creative Writing Committee that they are capable of doing justice to the program. A student who successfully completes the comprehensive examination for the Ph.D. degree may be exempted from the thesis requirement for the degree of Master of Arts.

Examinations.—The candidate for the Master's degree will not be required to take any comprehensive examination; the required program of work in courses will be so planned as to assure that he will have some acquaintance with all the major authors and works of his field of concentration. Candidates for the Master's degree may be examined at any time by a departmental committee in the foreign languages they offer.

All candidates for the doctorate must take either the year's course in Old and Middle English at Stanford, or a written examination on the field. They must also take a comprehensive written examination at least one year before they anticipate receiving the degree. This examination will be given during the winter quarter and, if demanded, during the summer, but summer results will not be announced until the autumn quarter. Candidates will also take an oral examination over the period and background of the dissertation after approval of the dissertation by the Departmental Committee.

GRADUATE HONORS PROGRAM IN HUMANITIES

The Department of English participates in the Graduate Honors Program in Humanities leading to the degree of Doctor of Philosophy. For a description of that program, and fellowships offered in connection with it, see page 211.

LOWER DIVISION COURSES

A. Elementary Composition.—A course required of all first-year undergraduates who do not pass the matriculation test in English.
No credit, any quarter (Department Faculty) Sections hourly

2. English Composition.—Training in the technical skills of writing and in the criteria for recognizing clear and forceful expression. The student should take English *2a* and *2b* in consecutive quarters, as soon as possible after passing the matriculation test or English A. Freshmen may wish to elect also Library 1, a one-unit course in the use of the Library. The class meets Tuesday at eleven o'clock.

2a. General Composition.—A study of fundamental problems of grammar, paragraphing, diction, etc.
3 units, any quarter (Department Faculty) Sections hourly

2b. Exposition.—A course emphasizing expository methods: analytical organization, definition, etc.
3 units, any quarter (Department Faculty) Sections hourly

2d. Narration.—A course in basic problems of narrative and imaginative writing.
3 units, any quarter (Department Faculty) (See *Time Schedule*)

No student will be permitted to take English *2d* until he has passed *2a* and *2b*. With the permission of the instructors, Lower Division students who have done satisfactory work in the required English 2 courses may occasionally be admitted to advanced courses in writing.

7. Masterpieces of English Literature.—An intensive study of a few masterpieces of English literature, selected from various centuries and including such forms as poetry, drama, essay, and the novel.
4 units, winter quarter (Goldstein) MWThF 9
4 units, *spring quarter (Hoopes) MTWF 9

25. Shakespeare.—An introduction to Shakespeare, with rapid reading of most of the plays and the poems in chronological sequence. Open to all students, but each section will be limited to 120.
4 units, autumn quarter (Ryan) MTWF 9
4 units, *winter quarter (Hoopes, Bailey) TWThF 10; TWThF 2
4 units, *spring quarter (Sensabaugh) TWThF 2
4 units, *summer quarter (Ford) MTWThF 9

73. Modern British Humorists.—A detailed study of Oscar Wilde, Max Beerbohm, G. B. Shaw, G. K. Chesterton, and Aldous Huxley. The course will also include an inquiry into the nature, and a brief history, of humor, wit, and comedy.
3 units, winter quarter (Irvine) MWF 1

Introduction to the Chief Types of Literature.—These courses are open to all Lower Division and Upper Division students. Prospective English majors are urged to take them during their freshman and sophomore years as preparation for their Upper Division work. Courses in which over 120 students register may be divided into sections. No prerequisite.

75. Introduction to the Novel.—A reading course designed to introduce the general student to various species of novels—realistic, romantic, satiric, impressionistic, naturalistic; the novel of adventure, the novel of manners, the psychological novel, the philosophical novel—and to analysis of techniques of narration, characterization, etc. The reading will be selected from a wide field of English, American, and (in translation) European novels.

4 units, autumn quarter (Scowcroft) MTWF 1
4 units, *spring quarter (McNelis) TWThF 1

76. Introduction to Poetry.—A course designed to introduce the student to prosody, poetic forms and types, and to critical theories regarding poetry. A considerable number of masterpieces of English poetry will be studied in the light of these theories.

4 units, winter quarter (Stone) TWThF 11

77. Introduction to the Drama.—A course designed to familiarize the student with the principal dramatic forms, the development of dramatic art, and masterpieces of the theater from various periods and countries.

4 units, autumn quarter (Bailey) TWThF 2
4 units, *spring quarter (Johnson) MWThF 10

79. Introduction to Prose.—A course designed to introduce the student to various types of prose literature (exclusive of the novel): the essay; biography and autobiography; journals; letters; short story; history.

4 units, autumn quarter (McClelland) MTWF 10

91. Masterpieces of American Literature.—Intensive reading and analysis of a number of the shorter pieces of Hawthorne, Melville, Dickinson, Henry James, Stephen Crane, Eliot, O'Neill, and Faulkner.

4 units, winter quarter (Allen) MTWF 10

[**England.**—See History 105.]

[**World Literature and the History of Ideas.**—See Humanities 61, Classic Literature; 62, Medieval and Renaissance Literature; 63, Literature of the Enlightenment and the Modern World.]

UPPER DIVISION COURSES

[The following courses are open to third-year and fourth-year students of all departments.]

100. The English Bible as Literature.—An introduction to the narrative, prophecy, and poetry of the Old and New Testaments and selected books of the Apocrypha, with some attention to the history of the English Bible and to the use made of Biblical themes in English literature. Open to Lower Division students.

4 units [Not given in 1954–55]

102. Introduction to the English Language.—A course designed to give the student a knowledge of fundamental matters about the English language, to familiarize him with the terminology and classification of language, and to enable him to form standards of judgment about good English.

4 units, winter quarter (Ackerman) MTWF 11

125. Analysis of English Prose Style.—The intention of this course, which consists of detailed analysis and discussion of the prose of representative English and American authors, is to develop in the student a conscious sense of literary style. No prerequisite.

4 units, spring quarter (McClelland) TWThF 11

129. Scientific Writing.—An advanced course in exposition designed especially for science and engineering majors. Prerequisite: English 2, or equivalent.

3 units, autumn quarter (———) MWF 8, 10; TThS 8
3 units, *winter quarter (———) MWF 8, 9
3 units, *spring quarter (———) MWF 9, 10, 11

131. Exposition.—An advanced course dealing with the more difficult problems of presenting both technical and nontechnical subject matter. Prerequisite: English 2, or equivalent.

3 units, autumn quarter (McClelland) MWF 11

[**Argumentation.**—See Speech and Drama 121. The course is recommended to all English students.]

133. Directed Writing.—An intermediate course, in which the student is to practice a number of forms such as fiction, essay, and verse, on his own initiative. Open to sophomores so far as space permits. Prerequisite: English 2. This course may be repeated three quarters for credit.

4 units, autumn quarter (———; ———) MW 3–5; TTh 3–5
4 units, *winter quarter (———) MW 2–4
4 units, *spring quarter (———) MW 2–4
4 units, *summer quarter (———) MW 2–4

Studies of Individual or Related Authors.—The following courses, 140–153, are concerned with the ideas and the style of the authors treated in them, and with the development of these authors as literary artists. The courses stress close and detailed study of individual works. They are open to all undergraduates in the Upper Division in all University departments and, with the permission of the instructor, to well-prepared sophomore students.

140. Malory and the Arthurian Legend.
4 units, winter quarter [Not given in 1954–55]

141. Chaucer.—An introductory reading course in which the chief stress is laid on Chaucer as a literary artist, and on *The Canterbury Tales* as reflections of the life and thought of his times.
4 units, autumn quarter (Ackerman) MTWF 8
4 units, *spring quarter (Ryan) TWThF 11

142. Spenser.
4 units, autumn quarter (Hoopes) MTWF 9

143. Shakespeare.—An intensive study of four or five plays, including sources, stage history, and important critical material.
4 units, winter quarter (Whitaker) MTWTh 8

144. Milton.
4 units, spring quarter (Sensabaugh) TWThF 9

145. Swift.—A study of the best of his poetry and prose.
4 units, winter quarter (McNelis) TWThF 1

146. Pope.
4 units, autumn quarter (Loftis) TWThF 2

148. Wordsworth and Coleridge.
4 units, autumn quarter (Ford) TWThF 11

149. Byron, Shelley, and Keats.—A detailed study of Shelley and Keats, with some reference to Byron.
4 units [Not given in 1954–55]

151. Matthew Arnold.—A study of Arnold's important poetry and selections from the prose.
4 units, winter quarter (Stone) TWThF 2

152. Browning and Tennyson.
4 units, spring quarter (Stone) MTWTh 2

153. George Bernard Shaw.
4 units, autumn quarter (Irvine) MTWF 1

168. Major English Novelists of the Nineteenth Century.
4 units [Not given in 1954–55]

171. Contemporary Drama.—A study of Ibsen and subsequent dramatists —English, Continental, American. Lectures and discussions; critical papers. Open to third-year and fourth-year students of all departments.
4 units, winter quarter (Dodds) MTWTh 9

173. Twentieth Century English Literature to 1918.—(Exclusive of poetry and the drama.)
4 units, autumn quarter (McClelland) MTWF 1

174. Twentieth Century English Literature: 1918–1954.
4 units, spring quarter (McClelland) TWThF 1

176. Contemporary American Thought and Literature.—The influences of social and natural sciences on twentieth-century American literature.
4 units, autumn quarter (ALLEN) MWThF 2

177. American Literature of the Seventeenth and Eighteenth Centuries.
4 units, winter quarter (LEVIN) MTWF 9

178. American Prose, 1800–1850.
4 units [Not given in 1954–55]

182. English Literature of the Renaissance (1500–1660).
5 units, autumn quarter (WHITAKER) MTWThF 10

183. English Literature of the Restoration and Eighteenth Century (1660–1798).—Prerequisite: English 182.
5 units, winter quarter (LOFTIS) MTWThF 10

184. English Literature of the Nineteenth Century.—Prerequisite: English 183.
5 units, spring quarter (IRVINE) MTWThF 10

189. Special Work.—Under exceptional circumstances Upper Division students may enroll for special work under the supervision of some member of the department for credit not to exceed four units a quarter.
Any quarter By arrangement

[English 192, 193 and 194 are open only to seniors in the Department of English.]

192. Senior Seminar: Selected Topics in Renaissance Literature.—Prerequisite: English 182.
4 units, autumn quarter (SENSABAUGH) TTh 1–3

193. Senior Seminar: Selected Topics in Eighteenth Century Literature.—Prerequisite: English 183.
4 units, winter quarter (LOFTIS) MW 3–5

194. Senior Seminar: Selected Topics in Nineteenth Century Literature.—Prerequisite: English 184.
4 units, spring quarter (STONE) MW 3–5

ADVANCED UNDERGRADUATE AND GRADUATE COURSES

[Open only to English majors except with the permission of the instructor.]

201a, b, c. The Writing of Poetry.—This course is intended primarily for students seriously interested in the composition of poetry. Lower Division students may be admitted to this course and to English 251 and 252 upon application. English 251 or 252 must be taken simultaneously with English 201 or before it. This course may be repeated for credit.
201a. 2 units, autumn quarter (WINTERS) TF 3
201b. 2 units, winter quarter (WINTERS) TF 3
201c. 2 units, spring quarter (WINTERS) TTh 3

202a. Short-Story Writing. — Primarily an Upper Division and graduate course, open to students by permission of the instructor. Submission of sample manuscripts will be required of prospective students.
4 or 5 units, autumn and *summer quarters (SCOWCROFT) MW 3–5

202b. Short-Story Writing.—Continuation of *202a.* Besides the short story, problems of novel writing will be discussed. Submission of manuscripts and permission of instructor required.
4 or 5 units, winter quarter (SCOWCROFT) TTh 3–5

203a. Advanced Fiction Writing.—Open to Upper Division and graduate students by permission. Students wishing to enroll should leave samples of writing with the secretary of the English Department before the close of the preceding quarter.
4 or 5 units, winter quarter (STEGNER) MW 3–5

203b. Advanced Fiction Writing.—A continuation of English 203*a*, open by permission to students who have completed English 203*a* or its equivalent, and who have shown definite writing ability.
4 or 5 units, spring quarter (STEGNER) MW 3–5

218. The Middle English Romances. — Representative non-Arthurian romances in Middle English.
4 units [Not given in 1954–55]

231. Medieval Literature.
4 units, spring quarter (ACKERMAN) MTWF 8

237. The English Drama to 1642.
4 units, winter quarter (SENSABAUGH) TWThF 9
4 units, *summer quarter (JOHNSON) MTWThF 10

238. Comedy of the Restoration and Eighteenth Century.—Lectures and reports on the changes in comic form and expression from Etherege to Goldsmith and Sheridan.
4 units, spring quarter (BAILEY) TWThF 11

240. Shakespeare.—Field studies in Shakespeare production on the Tudor stage. In 1955, *Macbeth, A Midsummer-Night's Dream, 3 Henry VI, The Two Gentlemen of Verona,* in co-operation with the Oregon Shakespearean Festival's production of these plays at Ashland, Oregon. Lectures, discussion, observation of rehearsal and production, with critical or research papers. Lectures 10–12 daily.
2 units, summer quarter: July 22–August 5 (BAILEY)

241. The English Novel through the Eighteenth Century.—A study of the most significant novels, with emphasis on the development of the form.
4 units, winter quarter (SCOWCROFT) MTWTh 1
4 units, *summer quarter (SCOWCROFT) MTWThF 11

242. The English Novel in the Nineteenth Century.—A study of the most significant novels, with emphasis on the development of the form.
4 units, spring quarter (IRVINE) TWThF 9

251. The English Lyric.—A historical examination of lyric poetry considered in respect to the distinctions and historical relationships of schools and movements.
4 units, spring quarter (WINTERS) TWThF 11

252. The Theory and Practice of the Criticism of Poetry.
4 units, autumn quarter (WINTERS) TWThF 2

254. The Theory and Practice of the Criticism of the Drama.
4 units, spring quarter (BAILEY) TTh 1–3

255. The Theory and Practice of the Criticism of Fiction.—Entails selective reading from various kinds and lengths of fiction, as well as frequent critical papers.
4 units, spring quarter (STEGNER) MTWTh 2

264. Representative American Novelists.
4 units, summer quarter (ALLEN OR LEVIN) MTWThF 2

265. American Novelists.—Cooper, Hawthorne, Melville, James, Wharton, and Glasgow.
4 units, autumn quarter (WINTERS) TWThF 11

266. Chief American Poets, from 1630 to the Present.
4 units, winter quarter (WINTERS) TWThF 11

267. Emerson and Thoreau.
4 units, spring quarter (GROMMON) MTWF 1

269. The Rise of Realism in American Fiction.—Chief emphasis on Twain, Howells, Crane, Dreiser.
4 units, winter quarter (STEGNER) MTWTh 2

270. Contemporary American Fiction.—Intensive reading and analysis of the stories and novels of Gertrude Stein, Robert Penn Warren, Katherine Anne Porter, William Faulkner, and Thomas Wolfe.
4 units, summer quarter (ALLEN OR LEVIN) MTWThF 1

291. American Drama.—(Same as Speech and Drama 291. For description see page 299.)
4 units, winter quarter (HEFFNER, PHILBRICK, COLE) MTWF 10

292. Modern American Drama.—(Same as Speech and Drama 292. For description see page 299.)
4 units, spring quarter (HEFFNER, PHILBRICK, COLE) MTWF 10

294. Playwriting and Dramatic Structure.—(Same as Speech and Drama 294. For description see page 300.)
4 units, autumn quarter (HEFFNER, PHILBRICK) MTWF 9

295. Playwriting.—(Same as Speech and Drama 295. For description see page 300.)
4 units, winter quarter (HEFFNER, PHILBRICK) MTWF 9

296. Advanced Playwriting.—(Same as Speech and Drama 296. For description see page 300.)
4 units, spring quarter (HEFFNER, PHILBRICK) MTWF 9

299. Advanced Work in Writing and Criticism.
Any quarter By arrangement

[**Curriculum and Instruction in Secondary English I.**—See Education 284*a*.

GRADUATE COURSES

300. Thesis.
Any quarter By arrangement

301. Bibliography and Methods of Graduate Study.—Candidates for the A.M. degree only will take the first five weeks for two units of credit; all graduate students planning ultimately to take the Ph.D. will take the entire quarter for 4 units of credit.
2 or 4 units, winter quarter (JOHNSON) TTh 3–5

302. Problems and Methods of Textual Criticism.—A course dealing with the various methods used by scholars to determine authorship, and to establish the text of literary works of the fifteenth to eighteenth centuries.
4 units [Not given in 1954–55]

303. Tragedy.—A study of the theory and practice of tragedy in various literature from Aeschylus to O'Neill. Lectures and reports.
4 units, spring quarter (DODDS) MW 1–3

304. Seminar in Comedy.
4 units (BAILEY)
304a. The Nature of Comedy.
Autumn quarter M 7:30 p.m.
304b. The Great Satires.
Winter quarter M 7:30 p.m.

305. History of Literary Criticism in England.
4 units
305a. The Classical Background and the Renaissance. [Not given in 1954–55]
305b. The Restoration and Eighteenth Century. [Not given in 1954–55]
305c. The Nineteenth Century.
Autumn quarter (IRVINE) MW 3–5

308. Seminar in English Drama.
4 units, spring quarter (HEFFNER) TF 1–3

309. Modern English Language.—A study of phonetics, syntax, derivation, etymology, and meanings, with consideration of recent developments in the study of language.
4 units, spring quarter (MERITT) TWThF 9
4 units, *summer quarter (MERITT) MTWThF 9

310. Old English.—Elements of Old English grammar, with reading exercises.
4 units, autumn quarter (ACKERMAN) MTWF 9
4 units, *summer quarter (MERITT) MTWThF 11

311. ***Beowulf.***—Prerequisite: English 310, or equivalent.
4 units, winter quarter (ACKERMAN) MTWF 9

312. Middle English.—A study of the history and dialects of Middle English, with readings of representative selections from the literature.
4 units, spring quarter (ACKERMAN) MTWF 10

[**Gothic and Old High German.**—See Germanic Languages L251 and L257.]

314. Old English Poetry, exclusive of *Beowulf*.
4 units [Not given in 1954–55]

316. Elizabethan Language.—A study of the vocabulary, pronunciation, grammar, and orthography of the period.
4 units, spring quarter (MERITT) TWThF 11

317. Seminar in English Philology.
4 units [Not given in 1954–55]

318. Seminar in Middle English Literature.
4 units, winter quarter (VON LINDHEIM) MW 1–3

320. Chaucer.—A study of *Troilus and Criseyde* in some years and selected short poems in others, with attention to the structure and history of the works, and their literary significance.
4 units [Not given in 1954–55]

323. Rhetoric and English Literature in the Renaissance.
4 units (JOHNSON)
323a. The History of Rhetorical Theory and Teaching from Classical Times to the Renaissance.
Winter quarter MW 1–3
323b. Seminar Studies in English Literature of the Renaissance.
Spring quarter TTh 3–5

324. Shakespeare.—An introduction to the bibliography of Shakespearean literature, the history of the text, methods of critical study, special problems, and the study of several plays.
4 units (HEFFNER) [Not given in 1954–55]

325. Shakespeare Seminar.—A critical study of one or more plays.
4 units, autumn quarter (WHITAKER) TTh 1–3

330. Proseminar: English Literature of the Sixteenth Century.
5 units, winter quarter (WHITAKER) MW 1–3
5 units, *summer quarter (JOHNSON) MW 3–5

331. Literary Problems of the English Renaissance.
4 units [Not given in 1954–55]

334. The Age of Milton.
4 units (SENSABAUGH)
334a. Proseminar: Seventeenth Century Backgrounds.
Autumn quarter TWThF 10
334b. Seminar: Problems in Seventeenth Century Literature.
Winter quarter TTh 1–3

340. Proseminar: Eighteenth Century Backgrounds.
5 units, autumn quarter (LOFTIS) TWThF 11

341. Literary Problems of the Restoration and Early Eighteenth Century.
4 units, spring quarter (LOFTIS) TTh 1–3

344. Seminar in the Age of Johnson.—Investigation of the eighteenth century shift from discipline and tradition to ideas of sensibility and progress, with attention to causes and consequences.
4 units (BAILEY) [Not given in 1954–55]

350. Proseminar: Nineteenth Century Backgrounds.
5 units, winter quarter (FORD) MTWF 10

351. Literary Problems of the Romantic Period: Shelley and Keats.
4 units, autumn and *summer quarters (FORD) TTh 3–5

354. Victorian Prose: Carlyle and Arnold.—Wide readings in two major critical and social thinkers of the nineteenth century. Lectures and reports.
4 units, autumn quarter (DODDS) MW 1–3

358. Seminar: Literary Problems of the Nineteenth Century.
4 units, winter quarter (IRVINE) MW 3–5

361. Seminar in American Critics.—Prerequisite: English 266, or equivalent.
4 units, spring quarter (WINTERS) WF 3–5

371. Seminar in American Historians as Men of Letters.—Course 371*a* and *b* is a single continuous course. To receive credit, a student must take the course both quarters in the same year. Prerequisite: English 265 or 266 (266 may be taken concurrently with 371*a*).
8 units for both quarters [Not given in 1954–55]

395. Research Course.—In this course, the student pursues a special subject of investigation under the supervision of some member of the department. Thesis work is not to be registered under this course.
Any quarter By arrangement

396. Projects in Playwriting.—(Same as Speech and Drama 396. For description see page 300.)
4 units, winter, *spring, and *summer quarters (HEFFNER, PHILBRICK) By arrangement

The English Review Club meets two times quarterly to discuss recent publications and creative work of interest to graduate students in English. The department faculty is invited to alternate meetings.

GEOGRAPHY

C. LANGDON WHITE, Professor
JOSEPH E. WILLIAMS, Associate Professor
PAUL F. GRIFFIN, ROBERT N. YOUNG, Assistant Professors
JOHN THOMPSON, Instructor

A geographer's training must of necessity be very broad. If geography be considered as a science of relationships, then it is obvious that the more courses the student has in geology, biology, physical geography, and climatology, on the one hand, and in anthropology, economics, history, political science, and sociology, on the other, the abler geographer he should become.

A Lower Division student looking forward to a major in geography should take: Geography 1 (Introduction to Geography) and Geography 50 (Cartography). This sequence constitutes the foundation for all subsequent work in geography. If an Upper Division student who did not take this sequence while in the Lower Division decides to major in geography, he may take Geography 1 (Introduction to Geography) and Geography 104 (Geonomics).

Degree of Bachelor of Arts.—Any student may enroll as a major in geography upon attainment of Upper Division standing in the University, providing he has an average grade of C or higher and receives the approval of the geography faculty.

Course Requirements for the Major:

1.	Introduction to Geography	5 units
50.	Elementary Cartography	4 units
104.	Geonomics	5 units
111.	Geography of Eastern United States and Canada	4 units
112.	Geography of Western United States and Canada	4 units
120.	Geography of South America *or*	
130.	Geography of Asia *or*	
133.	Geography of the Soviet Union *or*	
145.	Geography of Europe (any two)	10 units
160.	Weather and Climate	5 units
161.	Physical Geography	5 units
182.	Field Methods and Techniques	3 units
183.	Geography of Soils	3 units
	Electives (chosen in consultation with adviser)	5 units
	Total	53 units

Course Requirements for the Minor:

1.	Introduction to Geography	5 units
4.	Economic Geography *or*	
104.	Geonomics	5 units
50.	Elementary Cartography	4 units
111.	Geography of Eastern United States and Canada	4 units
112.	Geography of Western United States and Canada	4 units
	Total	22 units

ADVANCED DEGREES

Degree of Master of Arts.—An undergraduate record of B grade or better in geography and other social science subjects will be required for admission to this department as a graduate student. The same average for at least one quarter of graduate work at Stanford is required for admission to candidacy for the Master of Arts. Normally the Master's degree requires one year and 45 units of graduate work. If the student enters graduate study without an adequate undergraduate background in geography, the time required for obtaining the degree of Master of Arts will be more than three quarters. The candidate may choose one of the systematic fields of geography, such as cartography or climatology, or the social science field. If the latter is chosen, the candidate must be prepared to do field work and show proficiency in gathering and analyzing data.

A thesis is required and may constitute nine units of the candidate's program. In general, it is expected that the candidate will complete the following with at least a B average:

A.	200.	Method and Scope of Geography	3 units
	204.	Economic Geography Seminar	3 units
	300.	Thesis with laboratory and/or field work	9 units ✓
	301.	Individual Research in Geography and Cartography	3 units
B.		Instruction in related fields such as biology, economics, history, physics, political science, sociology, anthropology, and statistics, as decided by a geography department adviser	17 units
C.		General Electives	10 units
		Total	45 units

Degree of Doctor of Philosophy.—Geography students with superior qualifications who wish to work for their Ph.D. degree are referred to the Graduate Division, Special Programs, page 98.

LOWER DIVISION COURSES

1. Introduction to Geography.—World survey of man's occupation and utilization of the earth. Basic interrelations of human life and elements of natural environment—climate, land forms, water features, soils, minerals, natural vegetation, and native animal life.
5 units, autumn and *winter quarters (WHITE, GRIFFIN) MTWThF 9

4. Economic Geography.—Relation, from the world point of view, of man's industries—agriculture, lumbering, mining and quarrying, fishing, manufacturing, transportation, and commerce—to the natural environment.
5 units, autumn, *winter, and *spring quarters (YOUNG, THOMPSON) MTWThF 8

10. Global Geography.—A general survey course on world geography. A sample study of each of several factors of the natural environment and its effect upon man's activities. No prerequisites, but not open to students who have had other courses in geography.
2 units, autumn, *winter, and *spring quarters (WILLIAMS, THOMPSON, YOUNG) T 2–4

50. Elementary Cartography.—Evolution of maps, the construction of projections and the study of distribution maps.
4 units, autumn and *winter quarters (WILLIAMS) TTh 2–5

UPPER DIVISION COURSES

104. Geonomics.—Function of the resources of agriculture and industry in the modern world.
5 units, winter quarter (WHITE) MTWThF 11

111. Geography of Eastern United States and Canada.—Eastern United States and Canada (east of the Rocky Mountains) are considered region by region in relation to the natural environment. Economic activities of each region are emphasized and related to the distribution of resources and population.
4 units, autumn quarter (GRIFFIN) MTWTh 11

112. Geography of Western United States, Canada, and Alaska. — A detailed study of the physiography, climate, soils, vegetation, mineral resources, industrial production, population distribution, and trends in the West from a regional standpoint.
4 units, winter quarter (GRIFFIN) MTWTh 11

120. Geography of South America.—Systematic study of the countries of South America. The economy of each country is analyzed in relation to its natural endowment and the culture of its people. Analysis of raw material production and of the development and prospects of manufacturing in Argentina, Brazil, and Chile. Special attention is given to the political and economic interest of the United States in this region.
5 units, spring quarter (WHITE) MTWThF 9

121. Geography of Middle America.—Systematic study of the lands and peoples of Mexico, the countries of Central America, and the islands of the Caribbean; their resources and production; their possibilities for future development; their role in international affairs and in inter-American relations.
3 units, winter quarter (THOMPSON) MWF 9

130. Geography of Asia.—A survey of the geographic backgrounds of Asia, excepting the USSR. Interrelationship of physical, economic, social, and political factors.
5 units, autumn quarter (GRIFFIN) MTWThF 8

131. Geography of India.
3 units (———) [Not given in 1954–55]

132. Geography of China.
3 units (———) [Not given in 1954–55]

133. Geography of the Soviet Union.—A study of the land, the people, and the resources in relation to the natural environment. Particular emphasis is given to the historic-geographical development, the new agriculture, the new industry, transport, and ethnic patterns.
5 units, winter quarter (Williams) MTWThF 10

134. Geography of Southeast Asia.
3 units (———) [Not given in 1954–55]

145. Geography of Europe.—A survey of the lands and peoples, climate, relief, resources, and economic activities.
5 units, spring quarter (Williams) MTWThF 11

150. Intermediate Cartography.—Topographical map drafting and interpretation of aerial surveys.
3 units, spring quarter (Williams) TTh 2–5

151. Advanced Cartography.—Advanced projects in merged-color-illumination of relief maps.
3 units, spring quarter (Williams) TTh 2–5

160. Weather and Climate.—An introduction to the facts and principles concerning the behavior of the atmosphere. Attention is given to the instruments and methods used in observing and measuring atmospheric conditions, and to the complex effects of solar radiation. Systems of climatic classifications and climates of the world are examined.
5 units, winter quarter (Young) MTWThF 1

161. Physical Geography.—A study of landforms as a physical basis for geography.
5 units, autumn quarter (Young) MTWThF 1

170. Conservation of National Resources.—Contribution of national resources to America's status as a world power, past exploitation of these resources, and the present-day policies of conserving them. Study of wind erosion, water erosion, problems of flood control and the use and control of water.
3 units, autumn quarter (Young) MWF 10

182. Field Methods and Techniques.—For geography majors only.
4 units, spring quarter (Young) M 1; W 1–5

183. Geography of Soils.
3 units, spring quarter (Young) MWF 8

191. Political Geography.—Geographical pattern of the major nations; their territorial structure, resources, industry, communications, national aspirations. Special consideration is given to the role of the United States in the world. Establishment of a base for analyzing current international trends.
5 units, spring quarter (Griffin) MTWThF 10

198. The Teaching of Geography.—A foundation course for teachers and supervisors in teaching the principles of geography, and home, journey, and regional geography in the first eight grades. Discussion of the organization of the course of study, source materials, textbooks, and the various methods of teaching geography in the social studies.
3 units, spring quarter (Griffin) MWF 3

200. Method and Scope of Geography.
3 units (Staff) By arrangement

204. Economic Geography Seminar.
3 units (STAFF) By arrangement

295. Geography for Teachers.—The role of geography in the social studies. Special attention is given to the curriculum, course of study, teaching objectives, and grade placement on the elementary and secondary level. Critical examination of source materials and visual aids, with demonstration lessons on the latter.
3 units, winter quarter (GRIFFIN) T 7–9

300. Thesis with Laboratory and/or Field Work.
9 units (STAFF) By arrangement

301. Graduate Research.
(STAFF) By arrangement

320. Graduate Research in Latin America.
3 units (WHITE) W 3–5

328. Geography and Contemporary World Problems.—The effects of the physical pattern of nations on modern economic and political development.
3 units, spring quarter (STAFF) MWF 9

330. Graduate Research in Asia.
(GRIFFIN) By arrangement

GERMANIC AND ROMANIC LANGUAGES

FREDERICK ANDERSON, ALFRED COESTER, AURELIO MACEDONIO ESPINOSA, BAYARD QUINCY MORGAN, STANLEY ASTREDO SMITH, Professors Emeriti
WILLIAM LEONARD SCHWARTZ, Associate Professor Emeritus
EARL KENDALL CARTER, Assistant Professor Emeritus
CLARA EBERHARD, Instructor Emeritus

FRIEDRICH W. STROTHMANN, RONALD HILTON, GEORGES EDOUARD LEMAITRE, JUAN B. RAEL, KURT F. REINHARDT, Professors
HENRY BLAUTH, AURELIO MACEDONIO ESPINOSA, JR., GAIL KEITH MEADOWS, ALEXANDER E. A. NAUGHTON, ROBERTO B. SANGIORGI, Associate Professors
HELMUT R. BOENINGER, CARMINE R. LINSALATA, DANIEL C. MCCLUNEY, JR., ISABEL SCHEVILL, GERTRUDE L. SCHUELKE, LEO WEINSTEIN, JOHN M. J. WOLPE, Assistant Professors
GRACE KNOPP, PAULINE NEWMAN, JESSIE SMITH, Instructors
———, ———, Acting Instructors
———, ———, Teaching Assistants

GENERAL POLICY OF THE DEPARTMENT

Courses not set down for any particular quarter will be given whenever there is sufficient demand for them.

The department accepts candidates for the degrees of Bachelor of Arts, Master of Arts, and Doctor of Philosophy, and for certification as high-school and junior college teachers. Special consideration is given to the needs of those who intend to make teaching their profession.

DEGREE OF BACHELOR OF ARTS

The degree of Bachelor of Arts may be taken in French, German, Italian, or Spanish.

Prior to admission to the Upper Division courses of this department, candidates for the degree of Bachelor of Arts must have completed the first- and second-year courses offered in the language of their choice.

In addition to these first- and second-year courses, candidates are expected to complete a minimum of 35 units, selected with the approval of their adviser, from courses numbered 100 and higher designated Fr, G, It, L, or Sp. These 35 units must include.

For French Majors: Fr. 110, Fr111, Fr112, Fr113, Fr130a, Fr130b, L150;
For German Majors: G100, G111, G112, G113, G131, G132, G133, G134, L151;
For Italian Majors: It111, It112, It113, It130;
For Spanish Majors: Sp110, Sp111, Sp112, Sp113, Sp130, and two courses to be chosen from those numbered Sp131, Sp132, Sp133, Sp134 or Sp151, Sp152, Sp153, Sp154.

In addition to the 35 units mentioned above, students not enrolled in the Honors Program in Humanities are to select a minimum of three courses or nine units from the General Courses given by this department.

DEGREE OF MASTER OF ARTS

The degree of Master of Arts may be taken in French, German, Italian, or Spanish. No student is accepted for candidacy unless he has completed the equivalent of the training represented by the requirements for the A.B. degree.

Requirements:

I. A reading knowledge of Latin.

II. 30 units of graduate work in the candidate's major field, to be distributed as follows:

a) Advanced Composition	6 units
b) One graduate seminar dealing with a specific linguistic or literary problem	2 units
c) One 5-unit course (or two courses totaling 6 units) in Philology	6 units
d) Three graduate courses in the History of Literature, to be chosen from courses numbered 200 or higher	12 units
e) Thesis	4 units

III. 15 units of electives chosen, with the approval of the student's adviser, from the General Courses in this department and from courses in other departments .... 15 units

Total .... 45 units

DEGREE OF MASTER OF ARTS IN TEACHING

Candidacy:

All candidates for this degree should consult the secretary to the Dean of the School of Education.

Requirements:

I. 30 units of graduate work in the candidate's major field, to be distributed as follows:

a) Advanced Composition	6 units
b) One graduate seminar dealing with a specific linguistic or literary problem	2 units
c) Philology (option: General Linguistics)	6 units
d) Three graduate courses in the History of Literature, to be chosen from courses numbered 200 or higher	12 units
e) Advanced Conversation	4 units

II. The following courses in Education:

- a) 110. Social Foundations of Education
- b) 115. Psychological Foundations of Education
- c) One of the following courses:
  1. 200. History of Education
  2. 204. Philosophy of Education
  3. 218. Administration of School Health Program
- d) Electives to bring the sum total to .... 15 units

Total .... 45 units

THE GENERAL SECONDARY CREDENTIAL FOR TEACHING FRENCH, GERMAN, OR SPANISH

State Minimum Requirements:

For the *Major* in any subject field: 36 semester hours or 54 quarter units. One-third of the 54 units required must be Upper Division or graduate courses. Minimum requirement of courses taken *as a Graduate*: 6 semester hours or 9 quarter units. These courses must either be graduate courses or such Upper Division courses for which graduate credit is granted by the Department.

For the *Minor* in the subject field: 20 semester hours or 30 quarter units.

Required language courses:

The following requirements will have to be met by all who want to be certified by Stanford for teaching French, German, or Spanish in a California high school. Students who have received the A.B. degree in French, German, Spanish, or Hispanic American Studies will have fulfilled most of the requirements listed below.

Teaching Major in French:

1. First-Year French	9 units
2. Fr21–25: Second-Year French	13 units
3. Fr27 or 28: Second-Year Conversation	2 units
4. Fr100: Advanced Conversation	3 units
5. Fr110: French Pronunciation	3 units
6. Fr111–113: Third-Year French Composition	6 units
7. Fr201–202: Advanced Composition and Grammar	6 units
8. TF248: Problems of Teaching French	4 units
9. Freely elected Upper Division or graduate courses dealing with the literature or civilization of France, totaling at least	14 units
Total minimum	60 units

Teaching Minor in French:

The following courses constitute the minimum requirements: First-Year French; Fr21–25; Fr27 or 28; Fr100; Fr111–113; TF248. This is a total of 37 units.

Teaching Major in German:

1.	First-Year and Second-Year German (G1, G2, G3, G22, G23, G24, and G25)	22 units
2.	G27: Second-Year Conversation	2 units
3.	G100: Advanced Conversation	3 units
4.	G111–113: Third-Year Composition	6 units
5.	G201–202: Advanced Composition and Grammar	6 units
6.	TG248: Problems of Teaching German	4 units
7.	Freely elected Upper Division or graduate courses dealing with the literature or civilization of Germany, totaling at least	17 units
	Total minimum	60 units

Teaching Minor in German:

The following courses constitute the minimum requirements for the teaching minor: First-Year German; G22–25; G27; G100; G111–113; TG248. This is a total of 37 units.

Teaching Major in Spanish:

1.	First-Year Spanish	9 units
2.	Sp21–25: Second-Year Spanish	13 units
3.	Sp27 or 28: Second-Year Conversation	2 units
4.	Sp100 or 104: Advanced Conversation or Spanish Dramatics	3 units
5.	Sp110: Spanish Pronunciation	3 units
6.	Sp111–113: Third-Year Composition	9 units
7.	Sp201–202: Advanced Composition and Grammar	6 units
8.	TS248: Problems of Teaching Spanish	4 units
9.	Freely elected Upper Division or graduate courses dealing with the literature or civilization of Spain or Hispanic America, totaling at least	11 units
	Total minimum	60 units

Teaching Minor in Spanish:

The following courses constitute the minimum requirement for the teaching minor: First-Year Spanish: Sp21–25; Sp27 or 28; Sp100 or 104; Sp111–113; TS248. This is a total of 40 units.

DEGREE OF DOCTOR OF PHILOSOPHY

The degree of Doctor of Philosophy may be taken with French, German, Italian,* or Spanish as a major. Candidates are not obliged to present a minor but they are urged to offer one. A minor in French, German, Italian, or Spanish is equivalent to requirement II*a*, *b*, *c*, *d*, for the degree of Master of Arts.

Candidacy:

Candidates should read carefully the general regulations governing the conferring of this degree, as described in the *Information Bulletin.* No student is accepted as a candidate until he has completed the equivalent of the training represented by the requirements for the Master of Arts degree as described above.

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* See under Graduate Division Special Programs.

General Requirements:

All candidates, regardless of their field of specialization, are expected to:

1. Have a reading knowledge of Latin and of one modern language other than the one in which the degree is taken.
2. Write a thesis that embodies such results of research as would merit publication.
3. Pass successfully an oral examination along the following lines:
   a) General Linguistics and the outlines of the History of the French (German, Italian, Spanish) Language.
   b) The general outlines of the History of Germanic or Romanic Literatures.
   c) The essentials of the political and cultural history of France (Germany, Italy, the Hispanic World).
   d) The principles of Literary Criticism.
4. Prove, by examination, that they can write and speak French (German, Italian, Spanish) correctly.
5. Have read the works enumerated in the department's reading list for their major language.
6. Candidates for the Ph.D. degree in one of the Romanic languages must have a reading knowledge of French, Spanish, and Italian or Portuguese.

Specialization:

1. All candidates specialize either in Philology (Germanic or Romanic) or Literature.
2. Candidates for the Ph.D. degree in Spanish specialize in the Literature and Civilization of Spain or Hispanic America. But they may not devote more than two-thirds of their graduate work to their special field.

Course Work:

1. Candidates for the Ph.D. degree should not enroll for more than 12 units per quarter. To insure breadth of training they are expected to take approximately one-third of their course work outside of the field of their major. In no case will they be expected to take more than 36 units of graduate work in their major, over and beyond the requirement for the Master of Arts degree.
2. All candidates are expected to participate every quarter in a Graduate Seminar.

GRADUATE HONORS PROGRAM IN HUMANITIES

The Department of Germanic and Romanic Languages participates in the Graduate Honors Program in Humanities leading to the Ph.D. degree. For a description of that program, and fellowships offered in connection with it, see pages 211-212.

COURSES OPEN TO ALL STUDENTS

The courses in this section do not require a knowledge of any language other than English. Students desiring French (German, Italian, or Spanish) language credit for these courses, must secure the permission of the department and do the assigned readings in French (German, Italian, or Spanish).

A. General Courses:

A100. Colloquium.—Analysis and discussion of significant authors and documents relevant to present-day problems. Student participation in discussion is expected. The specific topic will be announced each quarter. Enrollment limited to 15 students. This course may be taken for more than one quarter.
2 or 3 units, each quarter (Staff) T 4:15–5:45

A101. Science of Language.—An inquiry into the essential nature of language by comparison of the various Romance tongues among themselves and with other languages such as English, German, Swedish, American Indian, and Chinese.
3 units, spring quarter (Meadows) MWF 10

A161. Romance Life and Letters I: Chivalry.—This course deals with the historical development of the literature and civilization of France, Italy, Spain, and Portugal. It is intended for students in Romanic Languages and for those in other departments who wish to obtain a general knowledge of the development of Romance literature and civilization.
3 or 4 units (Hilton) [Not given in 1954–55]

A162. Romance Life and Letters II: The Faith.—A continuation of A161, but may be taken separately.
3 or 4 units (Hilton) [Not given in 1954–55]

A163. Romance Life and Letters III: The Noble and the Picaresque.—A continuation of A162, but may be taken separately.
3 or 4 units (Hilton) [Not given in 1954–55]

A164. Romance Life and Letters IV: The Age of Reason.—A continuation of A163, but may be taken separately.
3 or 4 units, winter quarter (Hilton) MWF 10

A165. Romance Life and Letters V: The Romantic and the Scientific.—A continuation of A164, but may be taken separately.
3 or 4 units (Hilton) [Not given in 1954–55]

A166. Romance Life and Letters VI: The Masses.—A continuation of A165, but may be taken separately.
3 or 4 units (Hilton) [Not given in 1954–55]

A185. Existentialism in Modern Thought and Literature.—Lectures on Nietzsche, Heidegger, Jaspers, Rilke, Kafka, Camus, Marcel, etc., dealing with basic problems of human existence.
3 units, spring quarter (Reinhardt) MWF 9

[Hispanic World Affairs Seminar.—See Humanities 248.]

AF. French:

AF65. The French Novel in Translation.—Significant novelists of the present day as well as of the past.
3 units, autumn quarter (Naughton) TTh 10

AF66. The French Drama and Comedy in Translation.—Plays by outstanding dramatists, mainly of the 19th and 20th centuries.
3 units, winter quarter (Naughton) TTh 10

AF67. French Thought.—A discussion of the views of significant French writers on problems of present interest.
3 units, spring quarter (Naughton) TTh 10

AF151. French Civilization I.—Origins: Roman Gaul; cultural, religious, and artistic background of French life during the Middle Ages until the Hundred Years' War. Lectures and outside readings.
3 units, autumn quarter (Lemaitre) MWF 9

AF152. French Civilization II.—The end of the Middle Ages; Renaissance and Reform; formation of the ideals of the Classical Age. Lectures and outside readings.
3 units, winter quarter (LEMAITRE) MWF 9

AF153. French Civilization III.—Literature, philosophy, and art in the seventeenth century and during the Enlightenment era, until the French Revolution. Lectures and outside readings.
3 units, spring quarter (LEMAITRE) MWF 9

AF154. French Civilization IV.—Political and social problems; cultural and religious developments from the French Revolution to World War I. Lectures and outside readings.
3 units, winter quarter (LEMAITRE) MWF 2

AF155. Political Problems of Contemporary France I.
3 units, autumn quarter (LEMAITRE) MWF 10

AF156. Political Problems of Contemporary France II.
3 units, winter quarter (LEMAITRE) MWF 10

AF157. Political Problems of Contemporary France III.
3 units, spring quarter (LEMAITRE) MWF 10

AF171. Contemporary French Novelists.—Lectures on significant authors of contemporary France: Proust, Gide, Malraux. Lectures and readings in English.
3 units (LEMAITRE) [Not given in 1954–55]

AF172. Sartre.—Introduction to French Existentialism. Lectures and readings in English.
4 units (LEMAITRE) [Not given in 1954–55]

AF175. From Cubism to Surrealism.—Modern French art against the background of French ideas and French social life. Lectures and readings in English.
4 units, spring quarter (LEMAITRE) MTWTh 2

AG. German:

AG51. Germany, Country between East and West.—Geography, history, civilization of Germany; its role today.
3 units, winter quarter (SOKOL) MWF 11

AG62. Modern German Art and Civilization.—Lectures and discussions on the main epochs and styles of modern German culture, illustrated with slides and recordings.
4 units, spring quarter (REINHARDT) MTWTh 9

AG64. Problems of Human Existence in Kierkegaard and Ibsen.
3 units (REINHARDT) [Not given in 1954–55]

AG75. Goethe's *Faust*.—Lectures in English, with reading of *Faust* in translation.
3 units, spring quarter (BLAUTH) MWF 10

AG81. Nietzsche.—Nietzsche's life and works, considered in relation to contemporary German thought and culture.
2 units, winter quarter (REINHARDT) TTh 2

AG83. Thomas Mann.—A study of the major works in both fiction and essay in English translation.
2 or 3 units (BOENINGER) [Not given in 1954–55]

AG84. Contemporary German Fiction.—A study of cultural and social trends in representative recent fiction (in translation).
3 units, autumn quarter (BOENINGER) TTh 9 [and conference by arrangement]

AI. Italian:

AI75. Dante in English.—Reading and interpretation of the *Vita Nuova* and the *Divine Comedy* in translation.
3 units [Not given in 1954–55]

AS. Spanish:

AS56. Introduction to Mexican Culture.—This course will deal mainly with Mexican folkways, but it will include also illustrated lectures on the fine arts and on the arts and crafts.
3 units, spring quarter (Rael) TTh 1 [and by arrangement]

AS57. Traditions and Folk Customs of the Spanish Southwest.—Wedding and religious customs; feasts; superstitions; legends, songs, tales, music, dances, plays, and other traditional forms of entertainment.
3 units (Rael) [Not given in 1954–55]

AS70. The Contemporary Spanish Drama.—Modern trends and tensions as reflected in contemporary Spanish dramatists.
2 or 3 units (Espinosa) [Not given in 1954–55]

AS75. Don Quixote in Translation.—Reading and interpretation of *Don Quixote.*
3 units, winter quarter (Linsalata) MWF 9

AS142. The Hispanic World.—Spain and Portugal.
2, 3, or 4 units, spring quarter (Hilton) TTh 8 [and by arrangement]

AS143. The Hispanic World.—Mexico and Central America.
2, 3, or 4 units (Hilton) [Not given in 1954–55]

AS144. The Hispanic World.—The Caribbean.
2, 3, or 4 units (Hilton) [Not given in 1954–55]

AS145. The Hispanic World.—The Pacific Coast Republics.
2, 3, or 4 units (Hilton) [Not given in 1954–55]

AS146. The Hispanic World.—The River Plate Republics.
2, 3, or 4 units, autumn quarter (Hilton) TTh 8 [and by arrangement]

AS147. The Hispanic World.—Brazil.
2, 3, or 4 units, winter quarter (Hilton) TTh 8 [and by arrangement]

AS148. The Hispanic World.—Problems of Spain and Latin America. This course may be repeated for credit.
2, 3, or 4 units, summer quarter (Hilton) TTh 8 [and by arrangement]

[The Hispanic World series of courses (AS142–AS148), given in English, provide, with convenient regional subdivisions, a general picture of Hispanic civilization, both in its sociological aspects (physical and human geography, social organization, resources and problems) and in its cultural aspects. An attempt is made to evaluate historically the achievements of Spain, Portugal, and Hispanic America, and their place in the world of both the past and the present. These courses are the basic requirement for the Hispanic American regional major.]

FR. FRENCH

First- and Second-Year Courses

[Under the direction of Leo Weinstein and John M. J. Wolpe]

[Note: Students registering for the first time in a first- or second-year course must take a placement test, if they have had any training in French before entering Stanford.]

Fr1. First-Year French.—This course aims primarily at a reading ability. Students desiring conversation are advised to take Fr6.
3 units, each quarter (Staff)

Fr2. First-Year French.—A continuation of Fr1 or Fr6.
3 units, each quarter (Staff)

Fr3. First-Year French.—A continuation of Fr2 or Fr7.
3 units, each quarter (Staff)

Fr5. Elementary French.—A special course for beginners, having particularly in mind the University requirements for the Ph.D. degree. Open to senior and graduate students only. Students who complete this course will be eligible for Fr26.
4 units, autumn and *summer quarters (Staff)

[Note: The series of courses designated Fr6, Fr7, and Fr8 is parallel in its reading material to Fr1, Fr2, and Fr3 respectively. Fr8, like Fr3, leads into Fr21.]

Fr6. First-Year Reading and Conversation.—This course aims at the acquisition of both a reading and speaking ability. It is recommended in place of Fr1 for students whose program permits them to take more than the minimum number of units necessary for the completion of the Lower Division language requirement. (See note on page 183).
5 units, autumn quarter (STAFF) MTWThF 1

Fr7. First-Year Reading and Conversation.—A continuation of Fr6.
5 units, winter quarter (STAFF) MTWThF 1

Fr8. First-Year Reading and Conversation.—A continuation of Fr7.
5 units, winter quarter (STAFF) MTWThF 1

Fr12. First-Year Conversation.—This course may only be taken simultaneously with Fr2 or Fr3.
2 units, autumn, *winter, and *spring quarters (STAFF)

Fr13. First-Year Conversation.—A continuation of Fr12. Prerequisite: Fr2.
2 units, autumn, *winter, and *spring quarters (STAFF)

[NOTE: Students intending to take advanced work in French should take the composition and conversation courses with the reading courses.]

Fr21. Second-Year Reading.—(See note above.) Prerequisite: Fr3 or Fr8.
3 units, each quarter (STAFF)

Fr22. Second-Year Reading.—A continuation of Fr21.
3 units, each quarter (STAFF)

Fr23. Second-Year Reading.—A continuation of Fr22. The sections of this course will be listed in the *Time Schedule* as *23a, 23b, 23c,* etc. The reading material assigned will vary from section to section; each section therefore constitutes an independent course and may be taken for credit.
3 units, autumn, *winter, *spring quarters (STAFF)

Fr24. Second-Year Grammar and Composition.—(See note above).
2 units, autumn and *winter quarters (STAFF)

Fr25. Second-Year Grammar and Composition.—A continuation of Fr24.
2 units, winter and *spring quarters (STAFF)

Fr26. Research French.—Reading and syntactical analysis of texts exemplary of technical journals and articles. Prerequisite: Fr5 or equivalent. Open only to senior and graduate students.
2 units, autumn and *winter quarters (STAFF)

Fr27. Second-Year Conversation.—Prerequisite: Fr13.
2 units, each quarter (STAFF)

Fr28. Second-Year Conversation.—Prerequisite: Fr27.
2 units, each quarter (STAFF)

Fr99. Individual Reading.—Prerequisite: Fr23. Enrollment only by special permission of the Department. Not required for majors in French. Thirty-six hours of reading per unit and a weekly conference with the instructor.
1 or 2 units, summer quarter (STAFF)

THIRD- AND FOURTH-YEAR COURSES

Fr100. Advanced French Conversation.—Prerequisites: Fr23, Fr25, and Fr28, or equivalent. May be repeated for credit.
3 units, spring quarter (———) MWF 11

Fr110. French Pronunciation.—This course should be taken by French majors in the first year. Prerequisite: Fr21, or equivalent.
3 units, autumn quarter (NEWMAN) MWF 11

Fr111. Third-Year French Composition.—Prerequisite: Fr23 and Fr25.
2 units, autumn quarter (———) TTh 11

Fr112. Third-Year French Composition.—A continuation of Fr111.
2 units, winter quarter (———) TTh 11

Fr113. Third-Year French Composition.—A continuation of Fr112.
2 units, spring quarter (———) TTh 11

Fr130a. Introduction to French Literature.—From 1800 to the present.
4 units, autumn quarter (WOLPE) MTWTh 10

Fr130b. Introduction to French Literature.—Prior to 1800.
4 units, winter quarter (WOLPE) MTWTh 10

Fr131. French Literature from Its Origins to the End of the Sixteenth Century.—Reading and interpretation of representative selections, special consideration of Villon, Rabelais, Marot, and the Pléiade.
3 units [Not given in 1954–55]

Fr141. French Literature in the Seventeenth Century.—Lectures in French. Outside reading.
3 units, winter quarter (NAUGHTON) MWF 9

Fr143. The Classical French Theater.—Lectures, readings, and reports with interpretation and discussion of representative plays of Corneille, Molière, and Racine. Conducted in English.
4 units, winter quarter (WEINSTEIN) MTWTh 1

Fr151. French Literature in the Eighteenth Century.
3 units, winter quarter (WOLPE) [Not given in 1954–55]

Fr155. Voltaire.
2 units, spring quarter (WOLPE) TTh 9

Fr160. Nineteenth Century French Literature I.
3 units [Not given in 1954–55]

Fr161. Nineteenth Century French Literature II.
3 units, autumn quarter (———) MWF 1

Fr162. Nineteenth Century French Literature III.
3 units, spring quarter (WEINSTEIN) MWF 1

Fr180. La Littérature française au vingtième siècle I. — Lectures on outstanding writers of the prewar period: Maeterlinck, Rostand, Anatole France, Loti, Romain Rolland. Lectures and readings in French.
3 units (LEMAITRE) [Not given in 1954–55]

Fr181. La Littérature française au vingtième siècle II.—Lectures on contemporary French dramatists: Giraudoux, Lenormand, Claudel, Montherlant, Anouilh, Salacrou. Lectures and readings in French.
3 units, autumn quarter (LEMAITRE) MWF 2

Fr182. La Littérature française au vingtième siècle III.—Lectures on modern French novelists: Jules Romains, Mauriac, Duhamel, Colette, Maurois, Saint-Exupéry. Lectures and readings in French.
3 units (LEMAITRE) [Not given in 1954–55]

Fr190. French Poetry.—A survey of French lyrical poetry from Villon to Valéry.
3 units, spring quarter (NAUGHTON) MWF 10

Fr199. Individual Work.—Thirty-six hours of reading per unit and weekly conference with the instructor. Open only to Upper Division majors in French.
1 to 3 units, summer quarter (STAFF) By arrangement

GRADUATE COURSES IN FRENCH AND FRENCH LITERATURE

Fr201. Advanced Composition and Grammar.—Prerequisite: Fr113.
3 units, autumn quarter (NAUGHTON) MWF 11

Fr202. Advanced Composition and Grammar.—A continuation of Fr201.
3 units, spring quarter (NAUGHTON) MWF 11

Fr205. Graduate Composition.
1 unit, each quarter (STAFF) By arrangement

Fr210. Middle French Literature.—Reading of Middle French texts from the fourteenth and fifteenth centuries; Villon.
2 units (MEADOWS) [Not given in 1954–55]

Fr211. Problems of Sixteenth Century French Literature.
4 units [Not given in 1954–55]

Fr212. Problems of Seventeenth Century French Literature.
4 units (NAUGHTON) [Not given in 1954–55]

Fr214. Problems of Eighteenth Century French Literature.
4 units, winter quarter (WOLPE) MWThF 3

Fr216. Problems of Nineteenth Century French Literature.
4 units, autumn quarter (WEINSTEIN) MTWTh 3

Fr218. Problems of Contemporary French Literature.
4 units, spring quarter (LEMAITRE) MW 3–4:30

Fr220. La Stylistique française.—A study of the resources of the French language and their use in various forms: literature, journalism, public and private speech, mainly in contemporary usage.
4 units (NAUGHTON) [Not given in 1954–55]

Fr250. Graduate Seminar.—Subject announced in *Time Schedule*.
2 units, autumn quarter (WOLPE) T 3–5
2 units, winter quarter (NAUGHTON) T 3–5
2 units, spring quarter (WOLPE) T 3–5

Fr299. Individual Work.—Exclusively for graduate students in French who are working on a thesis or engaged in special work.
1 to 3 units, each quarter (STAFF) By arrangement

G. GERMAN

FIRST- AND SECOND-YEAR COURSES

[Under the direction of Daniel C. McCluney and Gertrude L. Schuelke]

[NOTE: Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in German before entering Stanford.]

G1. First-Year German.—This course aims primarily at a reading ability. Students desiring conversation are advised to begin the conversation series G12, G13, and G27 as soon as possible.
4 units, each quarter (STAFF)

G2. First-Year German.—A continuation of G1.
4 units, autumn, *winter, *spring quarters (STAFF)

G3. First-Year German.—A continuation of G2.
4 units, autumn, *winter, *spring quarters (STAFF)

G5. Elementary German.—A special course for beginners, having particularly in mind the University requirements for the Ph.D. degree. Open to senior and graduate students only. Students who complete this course will be eligible for G26.
4 units, autumn and *summer quarters (STAFF) MTWTh 8

G12. First-Year Conversation.—Open to students who have completed G1 or equivalent.
2 units, winter and *spring quarters (STAFF)

G13. First-Year Conversation.—Prerequisite: G12 or qualifying examination.
2 units, spring quarter (STAFF)

[NOTE: Students intending to take advanced work in German should take the composition and conversation courses with the reading courses.]

G21. Second-Year Reading.—(See note above.)
3 units, each quarter (STAFF)

G22. Second-Year Reading.—A continuation of G21.
3 units, autumn, *winter, *spring quarters (STAFF)

G23. Second-Year Reading.—A continuation of G22. The sections of this course will be listed in the *Time Schedule* as *23a, 23b, 23c,* etc. The reading

material assigned will vary from section to section; each section therefore constitutes an independent course and may be taken for credit.
3 units, autumn, *winter, *spring quarters (STAFF)

G24. Second-Year Composition.—(See note above.)
2 units, autumn and *spring quarters (STAFF)

G25. Second-Year Composition.—A continuation of G24.
2 units, winter quarter (STAFF)

G26. Research German.—Reading and syntactical analysis of texts exemplary of technical journals and articles. Prerequisite: G5 or equivalent. Open only to senior and graduate students.
2 units, autumn and *winter quarters (STAFF)

G27. Second-Year Conversation.—Prerequisite: G13 or qualifying examination. This course may be repeated twice for credit. (See note above.)
2 units, autumn, *winter, and *spring quarters (STAFF)

G99. Individual Reading.—Prerequisite: G23. Enrollment only by special permission of the Department. Not required for majors in German. Thirty-six hours of reading per unit and a weekly conference with the instructor. This course may be taken for more than one quarter.
1 or 2 units, each quarter (STAFF)

THIRD- AND FOURTH-YEAR COURSES

G100. Third-Year Conversation.—Admission by examination. This course may be repeated twice for credit.
3 units, spring quarter (REINHARDT) MWF 10

G111. Third-Year German Composition.—Prerequisite: G23 and G25.
2 units, autumn quarter (BOENINGER) TTh 10

G112. Third-Year German Composition.—A continuation of G111.
2 units, winter quarter (BOENINGER) TTh 10

G113. Third-Year German Composition.—A continuation of G112.
2 units, spring quarter (REINHARDT) TTh 10

G131. Masterworks of German Literature.—Reading and interpretation of outstanding dramas, novels, and short stories of the classical period. Prerequisite: G23.
3 or 4 units, autumn quarter (MCCLUNEY) By arrangement

G132. Masterworks of German Literature.—Reading and interpretation of outstanding dramas, novels, and short stories of the nineteenth century. Prerequisite: G23.
3 or 4 units, winter quarter (MCCLUNEY) By arrangement

G133. Masterworks of German Literature.—Reading and interpretation of outstanding dramas, novels, and short stories written between 1890 and 1918. Prerequisite: G23.
3 or 4 units, spring quarter (MCCLUNEY) By arrangement

G134. Masterworks of German Literature.—Reading and interpretation of outstanding dramas, novels, and short stories written since 1918. Prerequisite: G132 or G133.
3 or 4 units, autumn quarter (BOENINGER) MWF 10

G140. The Dramas of Kleist, Grillparzer, and Hebbel.
3 units, spring quarter (MCCLUNEY) MTTh 2

G144. Goethes Dramen.
3 units, winter quarter (REINHARDT) MWF 2

G146. Goethes *Faust*.
4 units, autumn quarter (BLAUTH) MTWTh 11

G150. Schiller.
4 units (REINHARDT) [Not given in 1954–55]

G156. Das moderne Drama.
3 units (BOENINGER) [Not given in 1954–55]

G158. Die deutsche Lyrik.
3 units (REINHARDT) [Not given in 1954–55]

G199. Individual Work.—Thirty-six hours of reading per unit and weekly conference with the instructor. This course may be taken for more than one quarter. Open only to Upper Division majors in German.
1 to 3 units, each quarter (STAFF) By arrangement

GRADUATE COURSES IN GERMAN AND GERMAN LITERATURE

G201. Advanced Composition and Grammar.—Prerequisite: G113.
3 units, winter quarter (BLAUTH) By arrangement

G202. Advanced Composition and Grammar.—A continuation of G201.
3 units, spring quarter (BLAUTH) By arrangement

G205. Graduate Composition.
1 unit, each quarter (STAFF) By arrangement

G211. Deutsche Literatur- und Kulturgeschichte I.—(Von den Anfängen bis zur Reformation.)
4 units (SCHUELKE) [Not given in 1954–55]

G212. Deutsche Literatur- und Kulturgeschichte II.—(Von der Reformation bis zu Goethes Tod.)
4 units, spring quarter (BLAUTH) MTWTh 11

G213. Deutsche Literatur- und Kulturgeschichte III.—(Romantik und Realismus.)
4 units, autumn quarter (REINHARDT) MTWTh 2

G214. Deutsche Literatur- und Kulturgeschichte IV.—(Vom Naturalismus bis zu Gegenwart.)
4 units, winter quarter (BOENINGER) MTWTh 11

G222. Bibliographie der Literaturgeschichte.
1 unit, winter quarter (MCCLUNEY) By arrangement

G230. Die Methodenlehre der Literaturwissenschaft.—The new approaches to literary criticism: Herder, Dilthey, Spranger, etc.
2 units* (REINHARDT) [Not given in 1954–55]

G250. Graduate Seminar.—Subject announced in *Time Schedule.*
2 units, autumn quarter (BLAUTH) W 3–5
2 units, winter quarter (STROTHMANN) W 3–5
2 units, spring quarter (REINHARDT) W 3–5

G299. Individual Work.—Exclusively for graduate students in German who are working on a thesis or engaged in special work.
1 to 3 units, each quarter (STAFF) By arrangement

IT. ITALIAN

[NOTE: Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Italian before entering Stanford.]

It1. First-Year Italian.—This course aims primarily at a reading ability. Students desiring conversation are advised to take It11 with It1, It12 with It2, It13 with It3.
3 units, autumn quarter (SANGIORGI) MWF 1

It2. First-Year Italian.—A continuation of It1.
3 units, winter quarter (SANGIORGI) MWF 1

It3. First-Year Italian.—A continuation of It2.
3 units, spring quarter (SANGIORGI) MWF 1

It5. Elementary Italian.—A special course for beginners, having particularly in mind the University requirements for the Ph.D. degree. Open to Upper Division and graduate students only. Students who complete this course will be eligible for It3 or It21.
4 units, winter quarter (MEADOWS) MTWTh 1

It11. First-Year Conversation. — This course may only be taken simultaneously with It1 or It2.
2 units, autumn quarter (SANGIORGI) TTh 1

It12. First-Year Conversation.—A continuation of It11. This course may only be taken simultaneously with It2 or It3.
2 units, winter quarter (SANGIORGI) TTh 1

It13. First-Year Conversation.—A continuation of It12. This course may only be taken simultaneously with It3 or It21.
2 units, spring quarter (SANGIORGI) TTh 1

It21. Second-Year Reading.
3 units, autumn quarter (SANGIORGI) MWF 11

It 22. Second-Year Reading.—A continuation of It21.
3 units, winter quarter (SANGIORGI) MWF 11

It23. Second-Year Reading.—A continuation of It22.
3 units, spring quarter (SANGIORGI) MWF 11

It26. Research Italian.—Reading and syntactical analysis of texts exemplary of technical journals and articles. Prerequisite: It5 or equivalent. Open only to senior and graduate students.
2 units, autumn and *spring quarters (SANGIORGI) By arrangement

It99. Individual Reading.—Prerequisite: It23. Enrollment only by special permission of the Department. Not required for majors in Italian. Thirty-six hours of reading per unit and a weekly conference with the instructor. This course may be taken for more than one quarter.
1 or 2 units, each quarter (SANGIORGI) By arrangement

It111. Italian Composition and Conversation.
4 units, autumn quarter (SANGIORGI) By arrangement

It112. Italian Composition and Conversation.—A continuation of It111.
4 units, winter quarter (SANGIORGI) By arrangement

It130. Introduction to Italian Literature.—A survey course of the history of Italian literature from its origin to the end of the eighteenth century. Lectures, outside reading, reports. This course is required of all majors.
4 units (SANGIORGI) [Not given in 1954–55]

It151. Dante, *La Divina Commedia*.—A study and interpretation of the text.
4 units, autumn quarter (SANGIORGI) MWF 10

It152. Dante, *La Divina Commedia*.—A continuation of It151.
4 units, winter quarter (SANGIORGI) By arrangement

It161. Italian Literature of the Middle Ages.—History of Italian literature from its origin to the end of the XIV century.
3 units, spring quarter (MEADOWS) MWF 1

It162. Humanism and Renaissance.—History of Italian literature and civilization during the XV and XVI centuries. The influence of the Italian Renaissance in Europe.
3 units (SANGIORGI) [Not given in 1954–55]

It163. Classicism and Romanticism.—Various aspects of Italian classicism and romanticism in the XIX century.
3 units (SANGIORGI) [Not given in 1954–55]

It165. Modern Italian Drama.—A survey of Italian drama from Goldoni to the present. Lectures and reports.
3 units (SANGIORGI) [Not given in 1954–55]

It199. Individual Work.—Thirty-six hours of reading per unit and a weekly conference with the instructor. This course may be taken for more than one quarter. Open only to Upper Division majors in Italian.
1 to 3 units, each quarter (STAFF) By arrangement

It250. Graduate Seminar.—Subject announced in *Time Schedule.*
2 units, autumn and winter quarters (SANGIORGI) By arrangement

It299. Individual Work (for graduates).—Exclusively for graduate students in Italian who are working on a thesis or engaged in special work.
1 to 3 units, each quarter (MEADOWS, SANGIORGI) By arrangement

L. LINGUISTICS

GERMANIC AND ROMANIC PHILOLOGY

L150. History of the French Language.
2 units, spring quarter (MEADOWS) TTh 10

L151. History of the German Language.
2 units, winter quarter (SCHUELKE) TTh 11

L188. Fonética española.—Conferencias y ejercicios prácticos.
3 units (ESPINOSA) [Not given in 1954–55]

L200. Introduction to Romance Philology.—A general account of the principal Romance languages and their relation to Latin; phonology, morphology, and syntax. Prerequisite: A reading knowledge of Latin.
3 units, winter quarter (MEADOWS) MWF 2

L201. Old French.—The elements of phonology and morphology; reading of the *Chanson de Roland.* Prerequisite: L200.
3 units, spring quarter (MEADOWS) MWF 2

L205. Old Provençal.—Reading of selected poems of the troubadours, with the study of Old Provençal morphology and phonology.
3 units, winter quarter (MEADOWS) MWF 3

L211. Old Italian.—The phonology and morphology of Old Italian: preliterary linguistic monuments, the Sicilian School, and pre-Dantean literature.
3 units (MEADOWS) [Not given in 1954–55]

L212. Italian Dialects.—A study of the elements of phonology and morphology of the leading dialects of Italy, with reading of selected passages.
3 units, spring quarter (SANGIORGI) By arrangement

L221. Modern Romanian.—The elements of modern Romanian, phonology, morphology; designed primarily to give the student a reading knowledge. No prerequisites; open only to Upper Division and graduate students.
3 units (MEADOWS) [Not given in 1954–55]

L222. Modern Romanian Readings.—Selected readings from Creangă, Vlahută, Eminescu, etc.
3 units (MEADOWS) [Not given in 1954–55]

L230. History of the Spanish Language.—A study of the growth of the Spanish language from its origins to the present day.
3 units, spring quarter (ESPINOSA) MTTh 2

L231. Old Spanish I.—The elements of phonology and morphology with reading and interpretation of old Spanish texts. Prerequisite: L200.
3 units (ESPINOSA) [Not given in 1954–55]

L232. Old Spanish II.—A continuation of L231. Reading of old Spanish texts.
4 units, winter quarter (ESPINOSA) MTThF 11

L239. Hispanic Dialectology.—A study of the leading principles of the phonology, morphology, and syntax of the languages and dialects of the Hispanic world. Prerequisites: L188, L200, and L231.
3 units (ESPINOSA) [Not given in 1954–55]

L251. Gothic and Historical Germanic Grammar.—An introduction to the development of the Germanic Languages, combined with the reading of selected texts from the Gothic Bible.
5 units, autumn quarter (SCHUELKE) MTWThF 10

L253. Old Norse.
4 units, winter quarter (SCHUELKE) MTWTh 10

L255. Old Saxon.
2 units (SCHUELKE) [Not given in 1954–55]

L257. Old High German.
2 units (SCHUELKE) [Not given in 1954–55]

L258. Middle High German.
4 units, spring quarter (SCHUELKE) MTWTh 10

P. PORTUGUESE

P5. Elementary Portuguese.—An intensive course given primarily for social scientists and for students specializing in Hispanic American literature and civilization. This course cannot be taken to fulfill Lower Division language requirements.
5 units, autumn quarter (———) MTWThF 1

P6. Elementary Portuguese.—A continuation of P5.
5 units, winter quarter (———) MTWThF 1

P7. Elementary Portuguese.—A continuation of P6.
5 units, spring quarter (———) MTWThF 1

P99. Individual Reading.—Prerequisite: Completion of P7. Thirty-six hours of reading per unit and a weekly conference with the instructor. This course may be taken for more than one quarter.
1 to 3 units, each quarter (STAFF) By arrangement

SP. SPANISH

FIRST- AND SECOND-YEAR COURSES

[Under the direction of Carmine R. Linsalata and ———]

[NOTE: Students registering for the first time in a first- or second-year course must take a placement test if they have had any training in Spanish before entering Stanford.]

Sp1. First-Year Spanish.—This course aims primarily at a reading ability. Students desiring conversation are advised to take Sp6.
3 units, each quarter (STAFF)

Sp2. First-Year Spanish.—A continuation of Sp1 or Sp6.
3 units, each quarter (STAFF)

Sp3. First-Year Spanish.—A continuation of Sp2 or Sp7.
3 units, each quarter (STAFF)

Sp5. Elementary Spanish.—A special course for beginners, having particularly in mind the University requirements for the Ph.D. degree. Open to senior and graduate students only. Students who complete this course will be eligible for Sp26.
4 units, autumn and *summer quarters (STAFF) MTWTh 8

[NOTE: The series of courses designated Sp6, Sp7, and Sp8 is parallel in its reading material to Sp1, Sp2, and Sp3 respectively. Sp8, like Sp3, leads into Sp21.]

Sp6. First-Year Reading and Conversation.—This course aims at the acquisition of both a reading and speaking ability. It is recommended in place of Sp1 for students whose program permits them to take more than the minimum number of units necessary for the completion of the Lower Division language requirement. (See note above.)
5 units, autumn quarter (STAFF) MTWThF 1

Sp7. First-Year Reading and Conversation.—A continuation of Sp6.
5 units, winter quarter (STAFF) MTWThF 1

Sp8. First-Year Reading and Conversation.—A continuation of Sp7.
5 units, winter quarter (STAFF) MTWThF 1

Sp12. First-Year Conversation.—This course may only be taken simultaneously with Sp2 or Sp3.
2 units, autumn, *winter, and *spring quarters (STAFF)

Sp13. First-Year Conversation.—A continuation of Sp12. Prerequisite: Sp2.
2 units, autumn, *winter, and *spring quarters (STAFF)

[NOTE: Students intending to take advanced work in Spanish should take the composition and conversation courses with the reading courses.]

Sp21. Second-Year Reading.—(See note above.) Prerequisite: Sp3 or Sp8.
3 units, each quarter (STAFF)

Sp22. Second-Year Reading.—A continuation of Sp21.
3 units, each quarter (STAFF)

Sp23. Second-Year Reading.—A continuation of Sp22. The sections of this course will be listed in the *Time Schedule* as *23a*, *23b*, *23c*, etc. The reading material assigned will vary from section to section; each section therefore constitutes an independent course and may be taken for credit.
3 units, autumn, *winter, *spring quarters (STAFF)

Sp24. Second-Year Grammar and Composition.—(See note above.)
2 units, autumn and *winter quarters (STAFF)

Sp25. Second-Year Grammar and Composition.—A continuation of Sp24.
2 units, winter and *spring quarters (STAFF)

Sp26. Research Spanish.—Reading and syntactical analysis of texts exemplary of technical journals and articles. Prerequisite: Sp5 or equivalent. Open only to senior and graduate students.
2 units, autumn and *winter quarters (STAFF)

Sp27. Second-Year Conversation.—Prerequisite: Sp13.
2 units, each quarter (STAFF)

Sp28. Second-Year Conversation.—Prerequisite: Sp27.
2 units, each quarter (STAFF)

Sp99. Individual Reading.—Prerequisite: Sp23. Enrollment only by special permission of the Department. Not required for majors in Spanish. Thirty-six hours of reading per unit and a weekly conference with the instructor.
1 or 2 units, summer quarter (STAFF)

THIRD- AND FOURTH-YEAR COURSES

Sp100. Advanced Spanish Conversation.—Prerequisites: Sp23, Sp25, Sp28. May be repeated for credit.
3 units, autumn quarter (SCHEVILL) MWF 11

Sp102. Introduction to Commercial Practice.—Prerequisite: Sp25.
2 units [Not given in 1954–55]

Sp104. Spanish Dramatics.—Reading and staging of a Spanish play. This course may be repeated for credit.
3 units, spring quarter (SCHEVILL) **By arrangement**

Sp110. Spanish Pronunciation.—Lectures and practical exercises in the elements of Spanish pronunciation. This course should be taken by Spanish majors in the first year.
3 units, winter quarter (ESPINOSA) MTTh 1

Sp111. Third-Year Spanish Grammar and Composition.—Prerequisites: Sp23 and Sp25.
3 units, autumn quarter (RAEL) MWF 9

Sp112. Third-Year Spanish Grammar and Composition.—A continuation of Sp111.
3 units, winter quarter (RAEL) MWF 9

Sp113. Third-Year Spanish Grammar and Composition.—A continuation of Sp112.
3 units, spring quarter (RAEL) MWF 9

Sp130. Introduction to Spanish Literature.
5 units, autumn quarter (LINSALATA) MTWTh 10

Sp131. Spanish Literature during the Middle Ages.
3 units, winter quarter (ESPINOSA) MWF 10

Sp132. Spanish Literature during the Golden Age.
3 units (ESPINOSA) [Not given in 1954–55]

Sp133. Spanish Literature from 1700 to 1898.
3 units, spring quarter (HILTON) MWF 10

Sp134. Modern and Contemporary Spanish Literature.
3 units (HILTON) [Not given in 1954–55]

Sp142. The Spanish Novel of the Nineteenth Century.
3 units, spring quarter (LINSALATA) MWF 11

Sp144. Teatro español contemporáneo.—Estudio de los dramaturgos contemporáneos.
3 units (ESPINOSA) [Not given in 1954–55]

Sp150. Introduction to Spanish-American Literature.
3 or 4 units, summer quarter (HILTON)

Sp151. Spanish-American Literature I.—General introduction to Spanish-American Colonial Literature. The literature of Cuba and Venezuela. Prerequisite: Sp23.
3 or 4 units, autumn quarter (RAEL) MWF 8

Sp152. Spanish-American Literature II.—The literature of Bolivia, Chile, Colombia, Ecuador, and Peru. Prerequisite: Sp23.
3 or 4 units, winter quarter (RAEL) MWF 8

Sp153. Spanish-American Literature III.—The literatures and the cultural history of Argentina and Uruguay. Prerequisite: Sp23.
3 or 4 units (RAEL) [Not given in 1954–55]

Sp154. Spanish-American Literature IV.—The cultural history of Mexico and representative writers of literature. Prerequisite: Sp23.
3 or 4 units (RAEL) [Not given in 1954–55]

Sp162. El pensamiento hispanoamericano.—La cultura hispanoamericana interpretada por sus escritores.
3 units, autumn quarter (HILTON) MWF 10

Sp199. Individual Work.—Thirty-six hours of reading per unit and a weekly conference with the instructor. This course may be taken for more than one quarter. Open only to Upper Division majors in Spanish.
1 to 3 units, summer quarter (STAFF) By arrangement

GRADUATE COURSES IN SPANISH AND SPANISH LITERATURE

Sp201. Advanced Composition and Grammar.—Translations of connected English prose into Spanish. Original compositions. Dictation. Prerequisite: Sp113.
3 units, autumn quarter (SCHEVILL) MWF 3

Sp202. Advanced Composition and Grammar.—A continuation of Sp201.
3 units, winter quarter (SCHEVILL) MWF 3

Sp205. Graduate Composition.
1 unit, each quarter (STAFF) By arrangement

Sp211. History of Spanish Literature and Civilization I.—From the origins to 1500.
4 units (ESPINOSA) [Not given in 1954–55]

Sp212. History of Spanish Literature and Civilization II.—The sixteenth and seventeenth centuries.
4 units, spring quarter (ESPINOSA) MTThF 11

Sp213. History of Spanish Literature and Civilization III.—From 1700 to 1898.
4 units (HILTON) [Not given in 1954–55]

Sp214. History of Spanish Literature and Civilization IV.—From 1898 to the present time.
4 units, autumn quarter (LINSALATA) MTWF 11

Sp217. Spanish Drama of the Golden Age.
3 or 4 units, winter quarter (LINSALATA) MWF 2

Sp220. Cervantes.—Vida y obras de Cervantes. Conferencias, lecturas, e informes.
4 units (ESPINOSA) [Not given in 1954–55]

Sp225. Novelists of Mexican Revolution of 1910.—The reflection of the Mexican revolution in the literature of this period.
4 units, spring quarter (RAEL) MWF 8 [and by arrangement]

Sp226. The Modernist Movement in Spanish America.—A study of selections from the best poets who belong to this movement, and of their influence on subsequent writers.
4 units (RAEL) [Not given in 1954–55]

Sp250. Graduate Seminar.—Subject announced in *Time Schedule.*
2 units, autumn quarter (————) Th 3–5
2 units, spring quarter (ESPINOSA) Th 3–5

Sp299. Individual Work.—Exclusively for graduate students in Spanish who are working on a thesis or engaged in special work.
1 to 3 units, each quarter (STAFF) By arrangement

T. TEACHER TRAINING

[Under the direction of Isabel M. Schevill]

TF248. Problems of Teaching French.
4 units, each quarter (STAFF) By arrangement

TG248. Problems of Teaching German.
4 units, each quarter (STAFF) By arrangement

TS207. The Spanish Film and the Teaching of Spanish.
3 units, summer quarter (HILTON)

TS248. Problems of Teaching Spanish.
4 units, each quarter (STAFF) By arrangement

TS283. Spanish for Elementary Teachers.—An intensive course designed to prepare teachers of elementary schools to teach the elements of pronunciation and conversation in grades one through six.
3 units, spring quarter (SCHEVILL) M 7–10

[**Curriculum and Instruction in Junior College.**—See Education 289.]

HISTORY

YAMATO ICHIHASHI, RALPH HASWELL LUTZ, EDGAR EUGENE ROBINSON, PAYSON JACKSON TREAT, Professors Emeriti

THOMAS ANDREW BAILEY, CARL FREMONT BRAND, CLAUDE A. BUSS, DAVID HARRIS, GEORGE HARMON KNOLES, ANATOLE G. MAZOUR, JOHN C. MILLER, CHARLES D. O'MALLEY, Professors
WILLIAM CARROLL BARK, FRANK FREIDEL, H. STUART HUGHES, JOHN J. JOHNSON, RIXFORD K. SNYDER, WAYNE S. VUCINICH, ARTHUR F. WRIGHT, Associate Professors
DON E. FEHRENBACHER, THOMAS CARLYLE SMITH, Assistant Professors
ROLLAND C. ROGERS, Acting Assistant Professor
NATHANIEL CONSTANTINE ALLYN, EDWARD HOWARD BROOKS, HOWARD KAMINSKY, THOMAS L. KARNES, JOHN H. TRUEMAN, JAMES M. WOOD, Instructors
CLARENCE F. MCINTOSH, Acting Instructor

The Department of History offers to all students of the University courses of general cultural and educational value. It seeks not only to provide knowledge in special fields, but also to equip the student for his duties as a citizen, and to give him instruction which will aid him in law, journalism, library work; in local, state, and national public service; and in business where a knowledge of domestic and foreign affairs is desirable.

The course in the History of Western Civilization, which surveys the development of the Western world from earliest times to the present, is required by the University of all Lower Division students as a necessary part of a liberal education, and supplies a foundation for the other work in the department.

The department offers a variety of courses and programs for fulfilling the requirements of an undergraduate major in history. It further provides opportunity for advanced work leading to the A.M. and the Ph.D. degrees in certain fields in which the University is especially well equipped. This graduate study, together with the undergraduate seminars, provides professional training for those looking forward to careers of teaching and research. For the prospective teacher there are special programs planned in collaboration with the School of Education.

Within the department the undergraduate major student is urged to obtain breadth of view by a choice of courses in three or more of the fields offered in the department, at the same time securing specialized knowledge by the selection of courses and seminars in one field of special interest. For the degree of Bachelor of Arts, the department requires completion of 48 units of work in history (introductory, intermediate, and advanced courses, seminars, individual reading), with an average grade of not less than C. Included in these 48 units, an introductory seminar for 3 units and an advanced seminar for 5 units are required.

Each undergraduate major student in the department shall, in consultation with his adviser, select a minor to consist of a coherent group of courses totaling at least 20 units, to fall within one of the following categories: (1) economics, sociology, political science, geography, and Courses 51, 112, and 160 in psychology; (2) religion, philosophy, and the history of science; (3) the history of the visual arts and of music; (4) the literature of one period or people; (5) the Honors Program in Humanities (see pages 209–212).

The department accepts a few students each year for programs including two to six quarters of work under the University Independent Study Plan.

Such programs are under the direction of a member of the department faculty, are supplemented by regular course work, and are graded on the basis of an oral examination conducted by the Department. The choice of subject is the student's own, supplemented by advice from his adviser in the department. The James Birdsall Weter Memorial Scholarships are provided each year for students who carry on independent study programs within the Department of History.

In order to provide for students with special interests, the course work, seminars, and directed reading taken in the department, together with the minor and other work taken outside, may be devoted to the development of an integrated program to cover, for example: (1) an area, such as Central Europe, the Far East, Near East, or Latin America; (2) a period, such as Europe in the Middle Ages or in the nineteenth century; (3) a country, such as France, England, Russia, the United States, or Japan; (4) a civilization, such as American civilization or Chinese civilization.

Graduate students, candidates for advanced degrees, will be given personal guidance, but the purposeless graduate student will not be accepted by the department. For the degree of Master of Arts, the University Library contains adequate material in all of the customary lines of historical study. There are certain special fields, or substantial portions thereof, in which the department, by virtue of the specialized interests of its staff and the unusual resources of the Library, is prepared to offer graduate work leading to the Ph.D. degree.

1. *European History.*—(*a*) Middle Ages and the Renaissance and Reformation, especially the history of religion and technology; (*b*) Modern European History, especially the French Revolution and the Napoleonic Period, for which Stanford has the Jarbo Collection; (*c*) History of Germany and Belgium in the twentieth century; (*d*) History of Russia since 1914; (*e*) History of the Near East since 1914; (*f*) European History, 1914 to the present, with special reference to the origins, conduct, and results of World War I and World War II. The rich, and in some respects unique, collections of the Hoover Library on the causes, conduct, and result of World War I are being augmented for World War II and the period between these two wars. The materials include government documents, newspaper and serial files, and organization and party publications (especially British and German labor parties and the German Socialist parties). There are also important manuscript collections, including unpublished records of the Paris Peace Conference of 1919 and the Herbert Hoover Archives, which embrace the records of the Commission for Relief in Belgium; the American Relief Administration; the various technical commissions established at the close of World War I for reconstruction in Central and Eastern Europe; and the personal papers of Herbert Hoover as United States Food Administrator, Secretary of Commerce, and President of the United States. Other important materials for the period since 1914 relate to revolutions and political ideologies of international importance; colonial and minority problems; propaganda and public opinion, military occupation, peace plans and movements, international relations, international organization and administration including the publications of the League of Nations, the World Court, and the International Labor Office, as well as the principal international conferences. The collection on the Pacific since 1939 is being enlarged.

2. *British History.*—(*a*) English History since 1200, for which the Library contains important documentary sets; (*b*) The British Empire, with special reference to Canada since 1840, to India, and to Australia.

3. *United States History.*—(*a*) British North America to 1783, for which the Library has an unusually complete collection of printed sources; (*b*) Anglo-American Relations, for which Stanford has unusually complete pub-

lished documentary sets; (*c*) The National Period, for which the Library has extensive documents, newspapers, and manuscript collections; (*d*) History of the Far West, particularly California since 1848, for which use may be made of the Borel Collection.

4. *Latin-American History,* particularly Brazil, for which the Library contains the important Branner Collection.

5. *The Far East.*—(*a*) Diplomatic History of the Far East; (*b*) History of Japan; (*c*) History of China. The Stanford and Hoover Libraries have unusual materials for Far Eastern History, including large holdings of works in Western languages, such as runs of important serials and newspapers and extensive documentary collections on World War II in Asia, and also basic source and reference materials in the Chinese and Japanese languages, especially for the nineteenth and twentieth centuries.

The department requires for the Master's degree the presentation of an acceptable thesis, the passing of a written examination in one of the main historical fields, and a reading knowledge of one modern foreign language. The work of candidates for the degree of Doctor of Philosophy cannot be determined in advance by any list of specific courses regularly offered; such candidates will be given guidance in the field selected from those indicated above.

The department has several student assistantships at $400 each which are customarily held by candidates for advanced degrees. There is also the Cory Scholarship of $500 a year granted to a woman student in the History Department.

Applicants for the secondary teacher's credential in the social sciences are required to have completed with a grade of not less than B— at least 35–37 units of history, together with 10, 10, and 15 units in each of three of the other social sciences, namely, economics, political science, sociology, anthropology, and geography. Of the history units at least 15 must be in the history of the United States. Irrespective of work done elsewhere at least 8 units of history must be taken at Stanford University.

I. INTRODUCTORY COURSES

[Required of all Lower Division students. Opportunities for individual study are open to a small group of carefully selected students.]

10. History of Western Civilization.—A survey of Western Civilization to *ca.* A.D. 1000; prehistoric man, the Ancient Orient, Greece, Rome, and the early Middle Ages.

4 units, autumn quarter (HISTORY STAFF) M 11 (and three hours by arrangement)
4 units, *summer quarter (HISTORY STAFF) 5 hours to be scheduled

11. History of Western Civilization.—The major developments in Western Civilization in the later Middle Ages, the age of the Renaissance, and the seventeenth and eighteenth centuries.

4 units, winter quarter (HISTORY STAFF) M 11 (and three hours by arrangement)

12. History of Western Civilization.—Western civilization in the nineteenth and twentieth centuries.

4 units, spring quarter (HISTORY STAFF) M 11 (and three hours by arrangement)

II. INTERMEDIATE AND ADVANCED COURSES

Lecture courses numbered 100–129 are open to all students except freshmen; lecture courses numbered 130–199 are primarily for Upper Division and graduate students; courses numbered 200 and over, all of a special character, are for advanced and graduate students as indicated.

Courses in independent reading numbered 200–224 are designed not as a substitute for but as a supplement to work in class by providing for specialized readings. Prerequisites: at least an average grade of B in the University; at least an introductory course in the field; Upper Division standing; and permission of the instructor. In a few cases one or more of these prerequisites may be waived by special action of the department.

Introductory seminar courses numbered 225–249 are for history majors of junior standing and others by special permission of the instructor. Introduction to research methods in history; i.e., bibliographies, historical criticism, note taking, and the preparation of a documented paper; consult the instructor prior to registration.

Senior seminar courses numbered 250–274 are designed to provide an opportunity to apply the techniques acquired in the junior seminar to a detailed problem on which oral reports will be required and a documented paper prepared. Seniors who have completed their senior seminar and desire further research in a field in which they are prepared may enroll in senior research courses numbered 275–299.

A. The Ancient World

[See Classics, Section V, courses H100, H103, H200, H205, all of which are accepted for credit toward a major in History.]

B. Medieval and Renaissance Europe

100. Medieval Europe, 300–1300.—A study of the Middle Ages with emphasis upon the transition from ancient Mediterranean to European civilization and upon the development of medieval social and cultural institutions and ideas. Open to all students except freshmen.
5 units, autumn quarter (Bark) MTWThF 9

101. Renaissance, Reformation, and Counter-Reformation, 1300–1600.—Survey of the political, economic, religious, and intellectual factors involved in the expansion of European civilization with special emphasis upon the decline of medieval institutions and ideals and upon the emergence of new forms of thought and action. Open to all students except freshmen.
5 units, winter quarter (O'Malley) MTWThF 9

134. The Emergence of Medieval Europe.—A study of the genesis of European civilization from the end of Roman political unity through the Carolingian period. Consideration will be given to the victory and expansion of Christianity, the barbarian invasions, the Byzantine Empire and the rise of Islam, the Frankish state, and the foundation of a new, medieval unity.
3 units, winter quarter (Bark) MWF 9

141. The High Middle Ages.—An analysis of such aspects of European civilization in the twelfth and thirteenth centuries as the papacy and the Holy Roman Empire, the French and English monarchical states, the Crusades, medieval towns, the rise of universities, scholasticism, and Gothic art. Attention will be given to the medieval synthesis and the forces leading toward its dissolution.
3 units, spring quarter (Bark) MWF 9

204. Directed Reading in Medieval History.
3 to 5 units (Bark, ———) By arrangement

227. Introductory Seminar in Medieval History.—Introduction to the primary and secondary materials for the study of early European history, together with training in the techniques of historical research in this field.
3 units, winter quarter (Bark) T 2–4

253. Senior Seminar in Medieval History.—Group discussion and individual research in the problems of social and intellectual change in the Middle Ages.
5 units, spring quarter (Bark) Th 2–4

278. Senior Research in Medieval History.
Units, not to exceed 5 (Bark, ———) By arrangement

[For graduate courses, see Section III, page 207.]

C. Modern Europe

102. Europe, 1600–1789.—An economic, political, and cultural survey of the seventeenth and eighteenth centuries. Open to all students except freshmen.
5 units, autumn quarter (O'Malley) MTWThF 10

103. Europe in the Nineteenth Century.—A general survey from the eve of the French Revolution to the beginning of the twentieth century. Open to all students except freshmen.
5 units, winter quarter (Harris) MTWThF 10

104. Europe since 1914.—A survey of political, social, economic, and cultural developments to the present time. Open to all students except freshmen.
5 units, spring quarter (Hughes) MTWThF 10

112. Russia.—A general survey of the growth of the Russian Empire and the underlying causes of its downfall in the twentieth century. Open to all students except freshmen.
5 units, autumn quarter (Mazour) [Not given in 1954–55]

125. The Near East.—A survey of the Byzantine Empire, the medieval Slavic states, the origin and spread of Islam, the Ottoman Empire, and the development of the international problem of the Near East to 1800.
5 units, autumn quarter (Vucinich) MTWThF 10

139. The Age of Louis XIV.—France in the era of its cultural, diplomatic, and military predominance, and the expansion of French influence in Europe.
3 units, spring quarter (O'Malley) MWF 10

142. The French Revolution and the Napoleonic Era.—A study of the conditions in France before 1789, the Revolution from 1789 to 1799, the organization of France under Napoleon, the character of the Napoleonic Empire, and the reorganization of Europe at the Congress of Vienna, 1815. Open to Upper Division and graduate students.
3 units, autumn quarter (Harris) [Not given in 1954–55]

144. Italy since 1860.—A study of Italy from the unification to the present time. Open to Upper Division and graduate students.
3 units, winter quarter (Hughes) [Not given in 1954–55]

146. France since 1870.—A study of France from the foundation of the Third Republic to the present time. Open to Upper Division and graduate students.
3 units, winter quarter (Hughes) MWF 12

148. Germany since 1848.—A study of Germany from the Revolution of 1848 to the present time. Open to Upper Division and graduate students.
3 units, autumn quarter (Hughes) MWF 11

149. Intellectual History of Europe.—An historical analysis of some of the major currents of thought beginning with Natural Law and Utilitarianism.
3 units, spring quarter (Harris) MWF 11

150. European International Relations, 1814–1914.—Open to students having had History 103 or its equivalent.
3 units, autumn quarter (Harris) MWF 10

181. Nineteenth Century Russia.—An account of the political, social, and economic developments of the century, the transformation of the old social order into the modern State ending with the Revolution of 1917. Open to Upper Division and graduate students.
5 units (MAZOUR) [Not given in 1954–55]

182. The Russian Revolution.—A study of the revolutionary era from the fall of the Tsarist government to the present-day Soviet Russia. Open to Upper Division and graduate students.
5 units, spring quarter (MAZOUR) MTWThF 11

183. Soviet Foreign Policy.—A study of Soviet foreign policy in the West, Near, Middle, and Far East from 1917 to the present.
3 units, winter quarter (MAZOUR) [Not given in 1954–55]

186. The Balkans and the Near East since 1800.—An account of the decline of the Ottoman Empire and the rise of succession states in Europe and Asia, and their place in world politics. Open to Upper Division and graduate students.
4 units, winter quarter (VUCINICH) MTWTh 10

187. Muslim World.—A survey of the Muslim world since 1800. An account of the political and socio-economic developments affecting the Muslim peoples in the Near and Middle East, Russia, India, Southeast Asia, and Africa.
3 units, spring quarter (VUCINICH) MWF 10

206. Directed Reading in Modern European History.
3 to 5 units (HARRIS, HUGHES, MAZOUR, O'MALLEY, VUCINICH) By arrangement

230. Introductory Seminar in Modern European History: The Second World War.
3 units, autumn quarter (HUGHES) W 3–5

231. Introductory Seminar in Modern European History: Problems of 19th century international relations.
3 units, spring quarter (HARRIS) TTh 3–4

232. Introductory Seminar in Early Modern Europe.—Methods of historical investigation, interpretation, and exposition. Historical problems will be drawn from the history of early modern times.
3 units, winter quarter (O'MALLEY) Th 2–4

233. Introductory Seminar in Balkan and Near East History.
3 units, winter quarter (VUCINICH) T 2–4

234. Introductory Seminar in Russian History.
3 units, autumn quarter (MAZOUR) T 2–4

255. Senior Seminar in Balkan and Near East History.
5 units, spring quarter (VUCINICH) W 2–4

256. Senior Seminar in Contemporary Intellectual History.
5 units, spring quarter (HUGHES) W 2–4

257. Senior Seminar in Early Modern Europe.—Class discussion and preparation of a fully annotated report on some problem of the political and social history of early modern times.
5 units, spring quarter (O'MALLEY) Th 2–4

258. Senior Seminar in Russian History.
5 units, winter quarter (MAZOUR) T 2–4

259. Senior Seminar in 19th Century Europe.
5 units, autumn quarter (HARRIS) T 3–5

281. Senior Research.
Units, not to exceed 5 (HARRIS, HUGHES, MAZOUR, O'MALLEY, VUCINICH) By arrangement

[For graduate courses, see Section III, page 207.]

D. THE BRITISH EMPIRE

105. England.—A study of the English people through a survey of their political, economic, social, and cultural history. Open to all students except freshmen.

5 units, autumn quarter (BRAND) MTWThF 11

106. Great Britain since 1760.—Political history and foreign and colonial policy will be sketched, but emphasis will be placed upon such topics as the economic revolutions of the eighteenth century and their results, social reform, socialism, the labor movement, and the democratization of the Constitution. Open to all students except freshmen.

5 units, winter quarter (BRAND) MTWThF 11

107. The British Empire.—A survey of the development of the British Empire and of British colonial policy since 1783, with a consideration of the background of the present problems of the Dominions and the Colonies. Open to all students except freshmen.

5 units, spring quarter (SNYDER) [Not given in 1954–55]

158. English Constitutional History.—A study of Anglo-Saxon origins, Norman innovations, the legal, administrative, and parliamentary development under the Angevins, the limitation of royal power, and the rise of the cabinet system, and the democratization of the Constitution. Open to Upper Division and graduate students, and to sophomores by permission.

4 units, spring quarter (BRAND) MTWTh 9

176. History of Canada.—A survey of Canada from the settlement by the French to the present time, with a consideration of the racial, economic, political, and cultural problems that have influenced its history. Open to Upper Division and graduate students, and to sophomores by permission.

3 units, spring quarter (SNYDER) MWF 11

177. Australia and New Zealand.—A general survey of the political, economic, and cultural phases of these Dominions from their discovery to the present, with a consideration of the social experiments of the twentieth century. Open to Upper Division and graduate students, and to sophomores by permission.

3 units, winter quarter (SNYDER) MWF 11

179. Britain in Africa.—History and problems of the Union of South Africa from settlement to the present, with a consideration of the relations between Briton, Boer, and Black. Attention will be given to the tropical colonies, mandates, and trusteeships. Open to Upper Division and graduate students, and to sophomores by permission.

3 units [Not given in 1954–55]

214. Directed Reading in the History of England and the British Empire.—For students who under guidance desire to study a problem in English or British Empire history. Prerequisite: adequate preparation through course work; Upper Division standing; an average grade of B in the University.

3 to 5 units (BRAND, SNYDER) By arrangement

236. Introductory Seminar in English History.—An introduction to the nature and use of source materials for English history; training in bibliography making, note taking, historical criticism, and documentation. Primarily for history majors of junior standing.

3 units, autumn quarter (BRAND) Th 2–4

237. Introductory Seminar in British Empire History.—An introduction to the nature and use of source materials for the history of the Commonwealth and the dependent empire; training in bibliography making, note taking, historical criticism, and documentation. Primarily for history majors of junior standing.

3 units, winter quarter (———) T 2–4

260. Senior Seminar: Topics in Recent British History.—Techniques learned in the introductory seminar will be applied in the preparation of a substantial, documented paper. An advanced seminar primarily for history majors of senior standing.
5 units, winter quarter (BRAND) T 2–4

261. Senior Seminar: Topics in British Empire History.—An advanced seminar in which a topic from Canadian, Australian, or South African history will form the subject of a substantial paper, based on original research. Primarily for history majors of senior standing.
5 units, spring quarter (———) T 2–4

285. Senior Research.—For seniors who after completing their seminars desire further research in the history of England and the British Empire.
Units, not to exceed 5 (BRAND, SNYDER) By arrangement

[For graduate courses, see Section III, page 207.]

E. THE UNITED STATES

120. American History to 1789.—A survey of the transit of civilization from Europe to America, beginning with the colonial settlements, considering the development of an American society, and concluding with the establishment of independence and the formation of the Constitution. Open to all students except freshmen.
5 units, autumn quarter (MILLER) MTWThF 8

121. American History, 1789–1890.—A survey of the development of the United States from the establishment of the Constitution to the closing of the frontier. The major emphasis will be placed upon political development, with considerable attention to social and economic backgrounds and to the impact of events outside the United States. Open to all students except freshmen.
5 units, winter quarter (BAILEY) MTWThF 8

122. American History since 1890.—A survey of the transformation of the United States in the industrial age in its political, economic, and social development, and in its relation to the rest of the world. Open to all students except freshmen.
5 units, spring quarter (FREIDEL) MTWThF 8

123. American Social History.—A survey of the emergence of the American people, the development and conflicts of social classes, and the impact of expansion, industrialization, and urbanization upon society. Open to all students except freshmen.
5 units, autumn quarter (KNOLES) MTWThF 10

130. Diplomatic History of the United States.—A survey of American diplomatic history from colonial times to the present. Considerable attention is devoted to political, social, and economic forces that affected diplomatic developments. The lectures will complement the text, and will develop such topics as isolationism, the Monroe Doctrine, Manifest Destiny, and imperialism. Open to Upper Division and graduate students.
5 units, spring quarter (BAILEY) MTWThF 9

132. The Westward Movement in the United States.—A survey of the expansion of the American people and an examination of the influence of the West in national and international affairs. Special emphasis is placed upon the geographical bases of American development. Movement of population, expansion of boundaries, manifestations of sectionalism are given attention. A critical examination of the causes, effects, and results of the frontier experience of the American people. Open to Upper Division and graduate students.
5 units, autumn quarter (FEHRENBACHER) MTWThF 9

133. American Constitutional History.—A survey of American constitutional development, with special emphasis on colonial foundations of American constitutionalism, the nature and philosophy of the Constitution, and the significant trends in constitutional growth since the era of John Marshall.
5 units, winter quarter (FEHRENBACHER) MTWThF 8

135. History of American Political Parties.—A survey of American party history from the administration of George Washington to the present, the changing nature of political forces in the United States, and the basic political traditions of the major parties.
3 units, spring quarter (———) [Not given in 1954–55]

154. American Personalities of the Colonial Period.—An advanced study of the colonial period through a biographical approach to representative figures in the fields of politics, art, religion, literature, science, and military history. Personalities such as John Smith, Sam Adams, John S. Copley, William Byrd, George Washington, Thomas Hutchinson, Sir William Howe, Alexander Hamilton, and Dr. Benjamin Rush will be studied.
3 units, spring quarter (MILLER) [Not given in 1954–55]

155. The Colonial Mind.—American intellectual history in the seventeenth and eighteenth centuries, examining the religious and secular bases for American thought, the American response to currents of thought and opinion in Europe, and the concentration of American thought upon the political and social issues associated with independence. Open to Upper Division and graduate students.
3 units, spring quarter (MILLER) MWF 11

163. The American Revolution, 1760–1790. — Colonial backgrounds of the Revolutionary movement, causes of outbreak, military and diplomatic history of the war, the making of the Constitution, and the establishment of the federal government. Open to Upper Division and graduate students.
3 units, winter quarter (MILLER) MWF 11

164. The United States in World History.—An advanced survey from the age of discovery of the main currents of American development—political, economic, social, cultural—with special reference to the impact of development abroad on the course of United States history, and with some attention to the impact of the United States on the outside world. Open to Upper Division and graduate students.
3 or 4 units, autumn quarter (BAILEY) MWF 12

165. The Age of Roosevelt, 1933–1945.—A survey of political, economic, social, and intellectual trends in the United States during the New Deal and the Second World War. Open to Upper Division and graduate students.
3 units, winter quarter (FREIDEL) MWF 12

166. Intellectual History of the United States in the Nineteenth Century.—A survey of the changing climates of opinion in thought and expression in the United States during the nineteenth century. Open to Upper Division and graduate students.
5 units, winter quarter (KNOLES) MTWThF 10

167. Civilization of the United States in the Twentieth Century.—A study of American thought and expression during the twentieth century and the influences acting upon intellectual and cultural development. Open to Upper Division and graduate students.
3 units, spring quarter (KNOLES) MWF 1

168. The Age of Big Business, 1877–1919.—A survey of the rise of industrialism in the United States and its impact upon laborers, farmers, the urban middle class, and other nations, from Reconstruction through the First World War. Open to Upper Division and graduate students.
3 units, autumn quarter (FREIDEL) MWF 12

169. History of California.—A survey of the economic, social, and political development of California from the Spanish period to the present, with emphasis upon the years since 1850.
3 units, spring quarter (FEHRENBACHER) MWF 12

170. Civil War and Reconstruction, 1850–1877.—The political, constitutional, economic, cultural, and military aspects of the conflict between the North and South, with an emphasis upon its lasting effects upon American civilization. Open to Upper Division and graduate students.
3 units, autumn quarter (FREIDEL) [Not given in 1954–55]

216. Directed Reading in United States History.
3 to 5 units (BAILEY, FEHRENBACHER, FREIDEL, KNOLES, MILLER) By arrangement

238. Introductory Seminar in the History of the United States.—Basic training in historical research and writing in the period since 1789. Desirable background courses: History 120, 121, 122.
3 units, spring quarter (FREIDEL) T 2–4

239. Introductory Seminar in American History.—A consideration of research techniques, with special application to the United States since 1789, and with particular attention to a specific problem concerned with the political or diplomatic history of the United States since 1860. Desirable background courses: History 120, 121, 122, 130.
3 units, autumn quarter (BAILEY) TTh 1–2

240. Introductory Seminar in United States History.—An introduction to historical method through a series of problems which familiarize the student with important source materials for the national period of American history.
3 units, winter quarter (FEHRENBACHER) W 3–5

241. Introductory Seminar in American Social and Intellectual History.—Introductory study of the methods of historical scholarship and the nature and use of source materials in American social and intellectual history.
3 units, winter quarter (KNOLES) T 2–4

243. Introductory Seminar in American Colonial History.—Materials and methods for the study of the colonial period of American history. Open to history majors of junior standing.
3 units, autumn quarter (MILLER) T 3–5

263. Senior Seminar in the History of the United States.—A research seminar in twentieth-century American history.
5 units, autumn quarter (FREIDEL) T 2–4

264. Senior Seminar in American Political and Diplomatic History.—Class discussions and the preparation of a documented written report on some specific phase of a general problem relating to the period since 1898, such as the diplomacy of the Spanish-American War; the neutrality period, 1914–17; America and the peace, 1918–20; public opinion and foreign policy, 1935–41; etc.
5 units, winter quarter (BAILEY) W 3–5

265. Senior Seminar in American Colonial History.—A research seminar in American thought in the seventeenth and eighteenth centuries; projects in the origins and history of such subjects as religion and the social order, humanitarianism, political philosophy, and the impact of the Enlightenment. Open to history majors of senior standing.
5 units, winter quarter (MILLER) W 3–5

266. Senior Seminar in American Social and Intellectual History.—Application of techniques learned in the introductory seminar to the preparation of a documented paper dealing with some problem in American social and intellectual history.
5 units, spring quarter (KNOLES) W 2–4

267. Senior Seminar in the Political History of the American West.—The preparation of one or more documented papers in Western political history, using the techniques learned in the introductory seminar.
5 units, spring quarter (FEHRENBACHER) W 3–5

288. Senior Research in American History.
Units, not to exceed 5 (BAILEY, FEHRENBACHER, FREIDEL, KNOLES, MILLER) By arrangement

[For graduate courses, see Section III, page 207.]

F. LATIN AMERICA

117. History of Latin America to 1825.—A study of the discovery, conquest, and growth of both Spanish and Portuguese America, including the impact of the Wars of Independence upon the various political, social, and economic institutions that have developed.
5 units, autumn quarter (JOHNSON) MTWThF 11

118. Modern Latin America.—A survey of political, social, and economic institutions in the leading republics since Independence. The effect of economic growth since 1920 on social and political patterns of the area is emphasized.
5 units, winter quarter (JOHNSON) MTWThF 11

173. Historical Evolution of Mexico.—Economic and social development since 1850 and Mexican foreign relations, especially with the United States in the twentieth century, are stressed. Open to Upper Division and graduate students.
3 units, spring quarter (JOHNSON) [Not given in 1954–55]

174. History of Brazil.—A survey of the development of Brazil from its discovery to the present time, with emphasis on the post-World War I period. Open to Upper Division and graduate students.
3 units, spring quarter (JOHNSON) MWF 11

218. Directed Reading in the History of Latin America.
3 to 5 units (JOHNSON) By arrangement

244. Introductory Seminar in Latin-American History.—An introduction to the sources and methods for research in Latin-American history. Open to history majors and students in the Upper Division specializing in Latin-American studies who have had History 117 and 118 or an equivalent, and to others by permission.
3 units, winter quarter (JOHNSON) W 2–4

269. Senior Seminar in Latin-American History.—Research projects and reports, lectures, and discussions. Open to history majors and students in the Upper Division specializing in Latin-American studies who have had History 117, 118, and 244, or an equivalent, and to others by permission.
5 units, spring quarter (JOHNSON) W 2–4

293. Senior Research in Latin-American History.—Special guidance in individual research problems in Latin-American history. Open only to seniors who have had History 269 or an equivalent.
Units, not to exceed 5 (JOHNSON) By arrangement

[For graduate courses, see Section III, page 207.]

G. THE FAR EAST

113. History of the Civilizations of Eastern Asia: Early Period.—The origins of the civilizations of China and India, and their expansion into Central, Southeast, and Eastern Asia, and into Japan. Open to all students except freshmen.
5 units, winter quarter (WRIGHT) MTWThF 9

114. History of the Civilizations of Eastern Asia: Modern Period.—The development of civilization in China, India, Japan, and adjacent areas. Open to all students except freshmen.
5 units, spring quarter (SMITH) MTWThF 9

115. Diplomatic History of the Far East.—From the middle of the nineteenth century to the present time.
5 units, autumn quarter (BUSS) [Not given in 1954–55]

128. Recent History of the Far East.—The genesis, events, and aftereffects of World War II in the Far East.
5 units, summer quarter (BUSS) [Not given in 1954–55]

191. China in Modern Times.—The period from 1500 to the present with emphasis on the development of China's political and social institutions.
4 units, autumn quarter (WRIGHT) MTWThF 1

192. Intellectual History of the Far East.—The formation of the ideas and ideals of Far Eastern civilization, their expression in philosophy, their embodiment in institutions, and their influence on the development of society.
3 units, spring quarter (WRIGHT) MWF 2

193. Japan in Modern Times.—The period from 1868 to the present, with emphasis on the development of Japan's internal institutions and their influence upon foreign policy.
4 units, autumn quarter (SMITH) MTWTh 10

194. Modernization in Japan and China.—A comparative historical study of the influence of Western science, technology, and political ideas upon China and Japan since 1600.
4 units, winter quarter (SMITH) [Not given in 1954–55]

195. History of Modern India.—A survey of the history of India from the Moguls to the present.
3 units, winter quarter (SMITH) MWF 1

196. United States and the Far East.—The genesis and growth of American interests and policies in the Far East. Open to Upper Division and graduate students only. Desirable background courses: History 115 and 130.
4 units, winter quarter (BUSS) [Not given in 1954–55]

197. Southeast Asia and the Philippines.—With emphasis on recent developments resulting from the impact of Europeans and Americans on this area.
3 units, spring quarter (BUSS) [Not given in 1954–55]

198. China and the Steppe.—The history of the nomadic societies along China's land frontiers and of their role in Chinese history.
3 units (WRIGHT) [Not given in 1954–55]

220. Directed Reading in the History of the Far East.
3 to 5 units (SMITH, WRIGHT) By arrangement

245. Introductory Seminar: China.
3 units, autumn quarter (WRIGHT) T 2–4

246. Introductory Seminar: Japan.
3 units, winter quarter (SMITH) T 2–4

247. Introductory Seminar in Far Eastern History.
3 units, winter quarter (BUSS) [Not given in 1954–55]

270. Senior Seminar in Diplomatic History of the Far East.
5 units, spring quarter (BUSS) [Not given in 1954–55]

271. Senior Seminar: History of China.
5 units, winter quarter (WRIGHT) T 2–4

272. Senior Seminar: History of Japan.
5 units, spring quarter (SMITH) T 2–4

295. Senior Research in Far Eastern History.
Units, not to exceed 5 (SMITH, WRIGHT) By arrangement

[For graduate courses, see Section III, page 207.]

H. HISTORICAL LITERATURE

201. Historical Literature: Ancient and Medieval.—Directed reading in the classics of historical literature. The course is conducted by the methods of independent study with conferences and reports. Intended primarily for students who wish to continue independent study begun while taking History of Western Civilization. Registration limited; consult instructor.
3 units, winter quarter (BARK) By arrangement

III. GRADUATE COURSES

[These courses are designed for graduate students, candidates for advanced degrees in history and allied fields, and open to others only upon permission of the instructor.]

300. Historiography.—A course designed to familiarize the student with the writings and influence of the great historians from Herodotus to the present time. The work consists of lectures, papers, and class discussions. Required of all doctoral candidates in history.
5 units, winter quarter (HUGHES) W 3–5

301. American Historiography.—A survey of historical writing covering the political, economic, constitutional, diplomatic, social, and intellectual fields in each of the main periods of American history from the Colonial era through the Second World War. Required of all doctoral candidates majoring in American history; recommended for others.
5 units, winter quarter (FREIDEL) T 3–5

303. English Historiography.—A study of such major historians as Green, Freeman, Froude, Gardiner, Macaulay, and Lecky.
3 to 5 units, autumn quarter (BRAND) T 2–4

310. Interpretations of History.—Reports and discussion of the major interpretations of history.
3 to 5 units, spring quarter (HARRIS) By arrangement

312. Graduate Seminar in Medieval History.—Research upon selected topics in medieval history. Reading knowledge of Latin required.
5 units, autumn quarter (BARK) By arrangement

313. Graduate Seminar in the 16th Century.
5 units, autumn quarter (O'MALLEY) By arrangement

315. Problems of Contemporary Europe.—Colloquium for Ph.D. candidates.
3 to 5 units, autumn quarter (HUGHES) By arrangement

317. Problems of Nineteenth Century Europe.—Colloquium for Ph.D. candidates.
3 to 5 units, winter quarter (HARRIS) M 3–5

318. Graduate Seminar in Russian History.
5 units, spring quarter (MAZOUR) T 2–4

319. Graduate Seminar in Near Eastern History.
5 units, autumn quarter (VUCINICH) T 2–4

320. Graduate Seminar: Problems in Medieval English History.
3 to 5 units, winter quarter (BRAND) T 2–4

321. Graduate Seminar: Stuart England.—Topics and readings.
3 to 5 units, spring quarter (BRAND) T 2–4

327. Graduate Seminar in American Diplomatic History.—Specialized research in United States diplomatic history since 1860 on a theme topic, which is to be considered in its relation to larger contributing forces, such as economics and politics, both at home and abroad.
5 units, spring quarter (BAILEY) W 3–5

328. Graduate Seminar in American Social and Intellectual History.—Studies of foreign and domestic criticism of civilization in the United States, 1870–1940.
5 units, autumn quarter (KNOLES) T 2–4

330. Graduate Seminar in the History of the United States.—Studies in sectionalism, parties, and democracy.
3 units, spring quarter (———) W 2–4

337. Graduate Seminar in American Colonial History.
5 units, spring quarter (MILLER) T 3–5

340. Graduate Seminar in Latin-American History.—A study of the evolution of Latin-American historiography followed by the analysis of a major problem or phase of Latin-American history.
5 units, autumn quarter (JOHNSON) W 2–4

345. Graduate Seminar in Diplomatic History of the Far East.—Aspects of World War II in the Pacific.
5 units, spring quarter (BUSS) [Not given in 1954–55]

346. Graduate Seminar in the History of China.
5 units, spring quarter (WRIGHT) T 2–4

347. Graduate Seminar in the History of Japan.
5 units, autumn quarter (SMITH) T 2–4

360. Graduate Research in Medieval History.
Units, not to exceed 20 (BARK) By arrangement

363. Graduate Research in the History of the Renaissance.—Study of major source works and individual investigation of selected topics.
(O'MALLEY) By arrangement

365. Graduate Research: Modern European History.
Units, not to exceed 20 (HARRIS, HUGHES, MAZOUR, O'MALLEY, VUCINICH) By arrangement

370. Graduate Research in the History of England and the British Empire.—Individual guidance to properly qualified graduate students.
Units, not to exceed 20 (BRAND, SNYDER) By arrangement

378. Graduate Research in American History.—Guidance of graduate students preparing A.M. and Ph.D. theses, and of other properly qualified graduates by permission of the instructor.
Units, not to exceed 20 (BAILEY, FEHRENBACHER, FREIDEL, KNOLES, MILLER) By arrangement

380. Graduate Research: Latin America.—Advanced research open to students preparing A.M. and Ph.D. theses, and to other qualified graduates by permission of the instructor. Reading knowledge of Spanish and/or Portuguese required.
Units, not to exceed 20 (JOHNSON) By arrangement

385. Graduate Research: Far East.
Units, not to exceed 20 (SMITH, WRIGHT) By arrangement

[See also the courses in directed research in the Hoover Institute on War, Revolution, and Peace.]

HUMANITIES (SPECIAL PROGRAMS)

JOHN WENDELL DODDS, Director of Special Programs
FRIEDRICH W. STROTHMANN, Director, Graduate Honors Program in Humanities
RONALD S. CRANE, Visiting Professor of Humanities
RONALD HILTON, Director of Hispanic American Studies
ANTHONY E. SOKOL, Associate Director of Pacific-Asiatic and Russian Studies
PAUL FEJOS, Consulting Professor of Humanities and Anthropology
JEFFERY SMITH, Associate Professor of Humanities and Philosophy
ALEXANDER MILLER, Religion

Special Programs in Humanities include:

1. The Honors Program in Humanities
2. Graduate Honors Program in Humanities
3. Hispanic American Studies
4. Pacific-Asiatic and Russian Studies
5. Courses in Religion

Undergraduate programs for the Bachelor of Arts degree are offered in Hispanic American Studies, Pacific-Asiatic and Russian Studies, and in Humanities in conjunction with the Honors Program. The Honors Program, however, is offered primarily for those students who are majoring in some humanistic department.

Two programs are offered at the graduate level: (1) a graduate program for the Doctor of Philosophy in Humanities; (2) a program for the Master of Arts and Doctor of Philosophy in Hispanic American Studies.

HONORS PROGRAM

Committee in Charge: John W. Dodds (*Chairman*), Henry Blauth, †Philip W. Harsh, Robert Hoopes, George H. Knoles, Norman Philbrick, Jeffery Smith.

[Freshmen and sophomores who are interested in the Honors Program described below should consult with their Lower Division advisers and with the chairman of the Honors Committee. It is desirable that the student begin to plan his program as early as possible.]

Purpose of the Program:

The Honors Program aims to develop in its students a greater sense of the interrelatedness of the many strands that make up our knowledge and experience, and to make them more aware of basic values—intellectual, aesthetic, social, and ethical. It asks them not merely to acquire factual knowledge and scholarly techniques, but also to interpret their knowledge and techniques in the light of human values. The committee in charge, composed of representatives of various departments in the Humanities, will help each Honors student to plan a balanced and integrated program.

Admission to the Program:

A University average of "B" is required for admission to the program and for graduation with Honors in Humanities.

Students may enroll in the Honors Program under one of two alternative plans:

1. As prospective majors in the departments of Art and Architecture, Asiatic and Slavic, Classics, English, Germanic and Romanic Languages, History, Music, Philosophy, and Speech and Drama.

   In this case the Honors Program will supplement the Lower Division and departmental requirements, and students will graduate in the departments of their choice with Honors in Humanities.

   It should be noted that the Honors Program in Humanities may be used as a departmental minor where needed.

2. As prospective majors in Humanities.

   In this case the student will complete the Honors Program and, in addition, 30 units of predominantly Upper Division work (approved by the Honors Committee) in one of the departments listed above. He will receive a Bachelor of Arts degree in Humanities.

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† Absent on leave 1954–55.

Requirements of the Program:

1. Requirements during the first two years:
   - *a*) The general Lower Division requirements of Stanford University.
   - *b*) The "World Literature" sequence—Humanities 61, 62, 63, 12 units
   - *c*) Philosophy, a minimum of 8 units
   - *d*) Fine Arts (music, art and architecture, theater), a minimum of 8 units

[NOTE.—In exceptional cases, some of the work mentioned under *b*, *c*, and *d*, may be completed during the junior year.]

2. Requirements during the third year:
   - *a*) Participation for three quarters (1 unit each quarter) in the Humanities Colloquium—Humanities 100, 3 units
   - *b*) One three- or four-unit course each quarter dealing with one important personality (Sophocles, Shakespeare, Beethoven, etc.), or one significant document (*Divine Comedy, Bhagavadgita*, etc.). These courses must be taken outside the student's major department, or, in the case of Humanities majors, outside the department of their 30-unit concentration, 9–12 units

3. Requirements during the fourth year:
   - *a*) Participation, for three quarters, in the Senior Seminar in Humanities. 12 units
   - *b*) Senior essay.—In his senior year each Honors students will write a senior essay on a subject growing out of his departmental field, but not confined to it. A credit of 5 units is allowed for the essay.
   - *c*) Comprehensive examination.—In the last quarter of his senior year each student must pass a comprehensive oral examination centered in the field of the essay and testing the student's critical abilities.

[NOTE.—The Honors Program amounts to approximately 50 units (not including the University Lower Division requirements). To these 50 units must be added either the requirements of the major department, or, in the case of Humanities majors, 30 units of work done within one department.]

LOWER DIVISION COURSES

61, 62, 63. World Literature and the History of Ideas.—An introduction to fundamental ideas of the past, through lectures, discussions, and the reading of selected masterpieces of literature. The course is conceived of as a unity, and it is strongly recommended that students take all three quarters in sequence. Open to all students.

61. Classic Literature.—Including Homer, the Greek dramatists, Plato, Aristotle, Lucretius, Vergil, and the *Gospels of Mark* and *John*.
4 units, autumn quarter (GRESSETH) TWThF 11

62. Medieval and Renaissance Literature.—Including medieval epics, Augustine, Aquinas, Dante, Chaucer, Thomas More, Luther, Erasmus, Calvin, Montaigne, Spenser, Hobbes, and others.
4 units, winter quarter (HOOPES) TWThF 11

63. Literature of the Enlightenment and the Modern World.—Including Camus, Dostoyevsky, T. S. Eliot, Aldous Huxley, Kant, Thomas Mann, Bertrand Russell, Voltaire, Zola.
4 units, spring quarter (STROTHMANN) TWThF 11

UPPER DIVISION COURSES

100. Humanities Colloquium.—The analysis and interpretation of significant documents and works of art in terms of their fundamental meaning. The individual works discussed will be centered about a general theme selected for the quarter. Required of all Honors students during the junior year and open by permission of the Director of the Honors Program to a limited number of students not enrolled in the Program.
1 unit, each quarter (STAFF) T 4:15–5:45

175. Individual Work.—For students who have definite objectives not met by current course offerings.
2 to 4 units, each quarter (STAFF) By arrangement

[The Philosophy of Augustine.—See Philosophy 139.]

M105. Thomas Aquinas.—Reading and discussion of selected chapters from the *Summa Theologica.*
4 units (STROTHMANN) [Not given in 1954–55]

INTERDEPARTMENTAL SENIOR SEMINARS

191, 192, 193. Senior Seminar in Humanities.—Various manifestations of the nature of man will be studied, in the first quarter as they appear in the lives of significant men and women; in the second quarter as they are seen in works of literature, music, and the plastic arts; and in the third quarter as they are found in philosophy and history.
191. 4 units, autumn quarter (BLAUTH, SMITH) TTh 3–5
192. 4 units, winter quarter (LAPLANTE, SMITH) TTh 3–5
193. 4 units, spring quarter (MOTHERSHEAD, ———) TTh 3–5

200. Senior Essay.—An essay of about fifteen thousand words.
5 units (STAFF) By arrangement

GRADUATE HONORS PROGRAM IN HUMANITIES

Committee in Charge: John W. Dodds (*Chairman*), †Philip W. Harsh, Hubert C. Heffner, George H. Knoles, John L. Mothershead, Jr., F. W. Strothmann, Virgil K. Whitaker.

Stanford University offers a graduate program in the Humanities leading to the Ph.D. The degree, in each case, will be awarded jointly with one of the humanistic departments: "English and Humanities," "Philosophy and Humanities," etc. The participating departments are: Classics, English, Germanic and Romanic Languages, History, Philosophy, and Speech and Drama.

The intent of the program is to guarantee both intensive and extensive training on the graduate level. To this end it involves some continuing course work within the departmental discipline in which the student has already begun his specialized work. Beyond this it involves cross-departmental work in a series of courses planned especially for students in this program, allowing them to become familiar, in studies at the graduate level, with the stream of Western thought and with modern humanistic problems considered in the light of such thought. Thus the student extends the scope of his knowledge and usefulness in fields related to his departmental concentration, and in so doing makes of himself an even better teacher and scholar in the field of his special interest.

The Requirements for the Ph.D. in this Program.

I. Prerequisite for candidacy for the Program:
One year of work at the graduate level in a humanistic department.

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† Absent on leave 1954–55.

II. Normal requirements within the Program, based upon two years of course work at Stanford (in addition to the initial year mentioned above, at Stanford or elsewhere):

1. One course for each of six quarters in continuation of his departmental concentration.
2. One course for each of six quarters in the specially designed sequence "The Western Traditions"—the reading, interpretation, and discussion of the world's significant authors and thinkers.
3. One seminar for the three quarters of the first year of the Program in the discussion of basic humanistic problems of importance in the contemporary scene.
4. The equivalent of one-third of his second year in the Program to be flexible, and to be used to take cognate courses or to begin work on the dissertation.
5. The writing of a dissertation acceptable both to the Humanities Committee and the major department, as well as to the University Committee on Graduate Study (see general University regulations in the *Information Bulletin*).
6. The passing of a reading examination in two foreign languages, one ancient and one modern. (The examination in one of these two languages to be taken immediately after entry into the Program.)
7. The passing of a comprehensive written examination and the University oral examination.

FELLOWSHIPS

The Program awards a number of fellowships which are available to properly qualified graduate students. Detailed information concerning these may be obtained by addressing the Director of the Program.

GRADUATE COURSES

301, 302, 303. The Western Traditions.

301. The Classic Period.
4 units, autumn quarter (Harsh) [Not given in 1954–55]

302. The Classic Period.
4 units, winter quarter (Harsh) [Not given in 1954–55]

303. The Medieval Period.
4 units, spring quarter (Strothmann) [Not given in 1954–55]

304, 305, 306. The Western Traditions.

304. From the Renaissance to 1700.
4 units, autumn quarter (Crane, ———) MTWTh 9

305. From 1700 to 1900.
4 units, winter quarter (Crane, ———) MTWTh 9

306. The Twentieth Century.
4 units, spring quarter (Crane, ———) MTWTh 9

351, 352, 353. Basic Humanistic Problems.

351. The Specific Functions of the Various Humanistic Disciplines.
4 units, autumn quarter (Crane, Strothmann) M 7–9 p.m.

352. The Specific Functions of the Various Humanistic Disciplines.
4 units, winter quarter (Crane, Strothmann) M 7–9 p.m.

353. The Function of a University and the Meaning of Education.
4 units, spring quarter (Crane, Strothmann) M 7–9 p.m.

REGIONAL MAJORS

Programs are offered in the following areas: Hispanic America (undergraduate and graduate), and the Pacific, Asiatic, and Russian area (undergraduate only).

In an undergraduate regional major the student studies within the range of the language, literature, philosophy, arts, history, religion, social customs, governmental organization, and the cultural geography of one country or region. The comprehensive plan of these regional studies will present attractive opportunities to students who wish to gain, as far as time will permit, a comprehensive knowledge of some specific geographic and cultural area.

A regional major is important to a variety of students for different reasons:

1. It serves for many as one valid kind of general education. It has the intellectual advantage of concentration in a specific field, and yet offers a broad and inclusive approach to that field.

2. The regional major gives a foundation in language, national culture and history, geography, economics, and social and political institutions to those who might want to continue, at a graduate level, training which would equip them for specific positions in foreign countries.

HISPANIC AMERICAN STUDIES

Committee in Charge: John W. Dodds (*Chairman*), Paul R. Hanna, Ronald Hilton, John J. Johnson, James T. Watkins, C. Langdon White.

The Hispanic American Studies Program has a variety of activities. With the co-operation of the Committee on Public Exercises, the Hispanic Series of lectures is given at regular intervals. A monthly bulletin, the *Hispanic American Report*, seeks to give an accurate account of political and social developments in Spain, Portugal, and Latin America. The Director is Editor of Hispanic American Studies for the Stanford University Press and strives to stimulate the publication of serious books in the field.

The faculty members doing research and teaching in the Brazilian field have been organized into a special group to develop Stanford's tradition of work in these studies. During the summer quarters a Hispanic American Institute is held, visiting faculty are invited to the University, and special events are held. Bulletins are available describing the work of the Hispanic American Studies Program during the academic year. Bulletins may be obtained from the secretary of the Hispanic American Studies Program.

BACHELOR OF ARTS

Lower Division:

Language: The sequence of reading and composition courses, terminating with Romanic Languages Sp23 (reading) and Sp26 (composition)

Upper Division:

Language: Advanced Spanish Composition and Conversation (Romanic Languages Sp111, 112, 113)	9 units
Civilization: The Hispanic World (Romanic Languages 142–148)	10 units
Geography: Geography of South America (Geography 120, 5 units) and Geography of Middle America (Geography 121, 3 units)	8 units
Literature: Two courses of Spanish or Spanish American Literature	6 units
History: Latin America: the Colonial Period (History 117, 5 units) and Latin America since 1810 (History 118, 5 units)	10 units
Inter-American Relations: Latin America and the United States (Political Science 138, or an equivalent course, 5 units)	5 units
Anthropology: Cultural Problems in Latin America (Anthropology 158, 4 units)	4 units
Total number of units of Upper Division work	52 units

Students who wish to minor in any special field of interest may do so by completing 16 units of work in that field.

MASTER OF ARTS

Candidates for the Master's degree in Hispanic American Studies must fulfill satisfactorily the following requirements:

1. A reading, writing, and oral knowledge of Spanish or Portuguese (equivalent to Sp122), and a reading knowledge of the other of these two languages.
2. A satisfactory completion of courses followed. A minimum of 36 units is required with a grade of A or B, not including credit for the thesis.
3. A thesis on a regional subject, for which 9 units of credit are granted.
4. The student's program will stress the language, civilization, literature, geography, history, and political affairs of modern Spain and Latin America, with special reference to one of the following areas: Spain and Portugal, Mexico, Central America, Gran Colombia (Colombia, Ecuador, Venezuela), West Coast countries (Bolivia, Chile, Peru), River Plate countries (Argentina, Paraguay), Brazil, or Caribbean republics (Cuba, Dominican Republic, Haiti).

DOCTOR OF PHILOSOPHY

Candidates for the degree of Doctor of Philosophy in Hispanic American Studies must pursue graduate study for a minimum of nine quarters. In addition to course work, the candidate will write a doctoral dissertation and will take both oral and written examinations.

Candidates will be examined on two of the areas listed above. On account of its size and complexity, Brazil may count as two regions. They will also present either a minor, or 30 units of advanced work in disciplines or areas that are outside of the Hispanic World area. The plan for these 30 units will be made by the candidate in consultation with his adviser, and will be presented to the Committee on Hispanic American Studies for approval.

Candidates will be expected to have a reading command of both Spanish and Portuguese and an oral and written command of one of these languages and will thus satisfy the University language requirement.

Candidates for both the Master's and Doctor's degrees must have committee approval for admission to the program. They will normally be expected to have done their previous work in the Hispanic American or some related field. Candidates for the Doctor's degree must take a final written examination within the program to determine whether they are prepared to take the final University examination.

Hispanic American Studies may be presented as a minor for the doctorate.

TEACHING CREDENTIALS

For information concerning the program of study leading to a teaching credential, students should consult pages 32–33 and the credential secretary of the School of Education.

COURSES OF INSTRUCTION

248. Hispanic World Affairs Seminar.—Current developments in Spain, Portugal, and Latin America, with special reference to political, social, economic, and cultural developments. The investigations carried on by the seminar will be incorporated into the monthly *Hispanic American Report*.
3 to 5 units, every quarter (HILTON AND HISPANIC AMERICAN REPORT COMMITTEE) TTh 10

300. Thesis.
Any quarter By arrangement

375. Individual Work.
Any quarter By arrangement

PACIFIC-ASIATIC AND RUSSIAN STUDIES (UNDERGRADUATE)

Committee in Charge: John W. Dodds (*Chairman*), A. E. Sokol (*Vice-Chairman*), Claude A. Buss, Felix M. Keesing, Anatole G. Mazour, James T. Watkins.

The specific objectives of the program are to give the student training in one of the languages of the Pacific, Asiatic, and Russian regions; an over-all survey of their geography, peoples, history, politics, and cultures; and a more concentrated knowledge of a specific area within these regions.

Students wishing to major in the Pacific-Asiatic and Russian Program will choose a field of concentration (China, Japan, or Russia), and will select their courses in consultation with the vice-chairman of the program. Sixty units, equally divided between language and area, constitute a major in this program, leading to the A.B. degree.

A planned program of 25 units of language and area studies is offered as a possible minor for students who are majoring in other departments. A similar but broader program may also be taken as a minor for Ph.D. candidates in other departments. Such minors should be arranged in consultation with the major department and the vice-chairman of the program.

Students are urged, where possible, to begin the study of one of the languages in the freshman or sophomore years. Chinese, Japanese, and Russian are accepted in fulfillment of Lower Division language requirements.

For specific courses in the program, see under Department of Asiatic and Slavic Studies.

RELIGION

Committee in Charge: John W. Dodds (*Chairman*), Alexander Miller, Robert M. Minto, Frederic Spiegelberg, F. W. Strothmann, James T. Watkins IV.

The purpose of the program is to introduce students to the world-view of Biblical Religion as it has been developed and interpreted in the Western tradition and has been related to Western society. The study is systematic, historical, and comparative, with a double intention: to enable students critically to appraise the religious tradition in which they stand, and to supply them with the intellectual basis for a personal judgment.

COURSES OF INSTRUCTION

R10. The Christian Faith and University Education.—An introductory course in the Christian faith and its relation to the life of the university. The character of a university. The vocation of a student. The nature and ground of Christian faith and its relation to the main university concerns. Contemporary issues in the area of faith and knowledge. Open to Lower Division students.
1 unit, spring quarter (MILLER) T 11

R100. Comparative Religion.—The leading conceptions of the great world religions: Hinduism, Buddhism, Taoism, Confucianism, Shinto, Zoroastrianism, Manichaeism, and Mohammedanism are analyzed and compared with the leading ideas of Christianity. No prerequisite.
4 units, spring quarter (SPIEGELBERG) MTWTh 11

R102. Biblical Literature and Religion: Old Testament.—The sources and nature of Hebrew religion. The Covenant and the development of the

nation. The meaning of the prophetic faith. The Exile and return. Messianism and the significance of the Old Testament for Hebrew-Christian faith. No prerequisites.
4 units, autumn quarter (Miller) TWThF 9

R103. Biblical Literature and Religion: New Testament.—The early Christian community and the content of its faith. The Gospels and Epistles as documents of the church. The church in the Gentile world. No prerequisites.
4 units, winter quarter (Miller) TWThF 9

R110. History of Christian Social Thought: To the Reformation.—A survey of the historical relation of Hebrew-Christian faith to the development of Western society, to the end of the fifteenth century. No prerequisites.
4 units (Miller) [Not given in 1954–55]

R111. History of Christian Social Thought: The Reformation and After.—The interrelation of Christian thought and social life from the Reformation to the present day.
4 units (Miller) [Not given in 1954–55]

R112. Christianity and Contemporary Society.—A scrutiny of alternative forms of political and economic organization from the Christian point of view. A Christian critique of Communism as theory and practice. The basis of the Christian concern for democracy. No prerequisites.
4 units, spring quarter (Miller) TWThF 9

R113. The Christian View of Man and the World.—An outline course in Christian doctrine. The nature and source of Christian truth. The Biblical understanding of God. The Person of Christ and the meaning of salvation. Man and community. Prayer and providence. Death and Resurrection. No prerequisites.
4 units, autumn quarter (Miller) TWThF 11

R114. Christian Ethics.—The development of Christian Ethics from the Christian understanding of life. Comparison of Christian ethics with philosophical and scientific ethics. Does Christianity provide absolute standards of conduct? Nature of Christian decision and Christian obligation. No prerequisites.
4 units, winter quarter (Miller) TWThF 11

R190. Contemporary Movements in Religious Thought.—(Upper Division Seminar.) A discussion of influential trends in modern thought especially as affecting the church in Europe and America. Admission by permission of instructor.
4 units, spring quarter (Miller) TTh 1–3

R199. Individual Work.—Bible research or history of Christian dogma.
(Staff) By arrangement

INSTITUTE FOR JOURNALISTIC STUDIES

Chilton Rowlette Bush, Clifford Francis Weigle, Professors
Henry Lloyd Churchill, Associate Professor
James Everett Brinton, Paul John Deutschmann, Acting Assista
Professors

The Institute offers programs of graduate and undergraduate instruction journalism and engages in research in the problems of the media of journalis communication.

The curriculum is based on the assumption that education for journal must provide (1) general social intelligence, (2) specific knowledge of cer social, fiscal, industrial, and political principles and data, (3) an intelligent comprehension of the role of the journalistic media as social institutions, and (4) some technical ability in journalism. The requirements for the degree of Master of Arts are calculated to insure a realization of these objectives.

Admission.—In accepting the student as a major, the Institute takes into consideration the previous college record, the grades in English composition, and the grade in Journalism 50–51. Students who have not taken Journalism 50–51 or its equivalent while enrolled in the Lower Division and whose record in other respects is satisfactory are accepted only provisionally until they have completed Journalism 50–51.

Placement of Women.—It should be noted by prospective women majors that the proportion of positions on newspapers open to women is limited and that the number of magazines on the Pacific Coast is limited. The Institute will take these facts into consideration in the acceptance of women majors.

Degree of Master of Arts.—The Institute will recommend to the Committee on Graduate Study for the degree of Master of Arts students who have completed four fields in the social sciences, selected from two or more of the six groups listed below under requirements for the degree of Bachelor of Arts, and approximately 40 units of journalism, including an acceptable thesis, with an average grade of B on their entire program of study during the graduate year.

To complete this program successfully, the student must ordinarily plan his program at the beginning of his seventh quarter. It is recommended that the student have at least three months of practical experience before beginning the graduate year.

Candidates for the degree of Master of Arts entering the Institute from another institution, or from Stanford with the Bachelor's degree in a subject other than journalism, will follow individually arranged programs of study. In planning such programs, the following factors will be taken into account: (1) previous training in the social sciences; (2) previous academic training in journalism; and (3) practical journalistic experience. Where the student's previous work in the social sciences and in journalism has been limited, the requirements cannot be met in three quarters of residence.

Degree of Bachelor of Arts.—For the student who is unable to undertake the three-year program leading to the Master of Arts degree, the Institute offers a program leading to the degree of Bachelor of Arts. To fulfill the requirements for this degree with the major subject journalism, the student will take the following program:

1. In journalism a total of 25 to 30 units. Required are Journalism 50, 51, 103, 107, 120, and 140. In addition, the student preparing for newspaper or press association editorial work or radio-TV journalism will take Journalism 109, 169, and 175; the student preparing for advertising work will take Journalism 115, 116, and 156 or 217a and 217b; the student interested primarily in magazine writing will take Journalism 109, 169, and 150.

2. The student will take the courses listed below under "Pre-Journalism Curriculum."

3. He will complete one field in any two of the following groups:

I. Economics: Economic History, Monetary Theory and Problems, Price and Distribution Theory, Theory of Income and Employment, International Trade and Finance, Economics of Enterprise, Public Finance, Labor Problems, Public Regulation, and Economic Statistics. (Business Law may be substituted.)

II. Political Science: Public Administration, Comparative Government, International Law and Relations, Political Theory, Politics, and Public Law.

III. History: Medieval and Renaissance Europe, Modern Europe, the British Empire, the United States, Latin America, and the Far East.

IV. Sociology and Anthropology: courses to be designated.

V. Psychology: courses to be designated.

VI. Geography: courses to be designated.

Two advanced courses (i.e., courses numbered 100 or above) normally constitute a field. (The graduate student is strongly advised to select, in addition, a seminar in at least one of the four fields of his choice.) The undergraduate student must achieve a grade of C or higher in any course offered in fulfillment of field requirements.

The undergraduate student must average not lower than 2.5 grade points in the courses in journalism.

Pre-Journalism Curriculum.—The following courses which the student is not able to complete while in the Lower Division may be completed in his junior year: Psychology 51 and 112, Political Science 1 and 2, Economics 1 and 2, Sociology 1 (or Anthropology 2), two courses in general or English literature, preferably of the nineteenth or twentieth centuries, and Business 108*a*. The last requirement will be waived if the student can demonstrate adequate proficiency in typewriting.

Courses in the Institute, except Journalism 50 and 51, are open only to students in the Upper and Graduate Divisions.

Students transferring from other institutions who desire credit for some of the elementary courses in journalism may be required to take an examination in those subjects as a prerequisite to their enrollment as majors in journalism. Majors are required to take the Strong Vocational Interest Test before the end of the first quarter of their junior year.

Degrees in Mass Communication Research.—Graduate students who wish to prepare for careers as communication research specialists and who have adequate academic preparation or adequate professional background may become candidates for the Master of Arts and Doctor of Philosophy degrees. Candidates for the Master's degree will take the degree in journalism. The program will include courses in several of those departments which offer work in statistics, learning and perception, public opinion and propaganda, social psychology and social structure, and the methodology of the social sciences.

Unusually well-qualified students who wish to become candidates for the Ph.D. degree may present, through the Institute for Journalistic Studies in co-operation with appropriate other departments, a well-defined program to the Committee on Graduate Study and petition to become candidates for the degree in Mass Communication Research. (See "Graduate Division Special Programs," page 98.)

Ph.D. Minor.—Candidates for the degree of Doctor of Philosophy who are preparing to teach journalism are, in special cases, permitted to elect journalism as a minor field. The candidate, however, needs the consent of his major department.

LOWER DIVISION COURSES

50. Editorial Techniques I.—The theory of news communication for the newspaper and radio; analysis of the journalist's audience; representative media; journalistic vocations. Prerequisite: sophomore standing.

3 units, autumn quarter (BRINTON) **MWF 8**
3 units, *spring quarter (BRINTON) **MWF 8**

51. Editorial Techniques I Laboratory.—Practice in news writing. Weekly conferences, laboratory, and outside assignments. To be taken concurrently with Journalism 50. Prerequisite: sophomore standing.

1 unit, autumn quarter (BRINTON) By arrangement

1 unit, *spring quarter (BRINTON) By arrangement

UPPER DIVISION AND GRADUATE COURSES

103. Mechanics of Publishing. — Instruction relating to typography and printing processes. Lecture and laboratory. To be taken concurrently with Journalism 107. Prerequisite: Journalism 50–51. Nonmajor students require consent of instructor.

3 units, winter quarter (BRINTON) Lec. TTh 8; Lab. by arrangement

107. Editorial Techniques II.—Instruction and practice in copy editing, headline writing, news display, illustration, and newspaper library reference methods. In laboratory, the class edits the daily teleprinter report of the Associated Press or the United Press. To be taken concurrently with Journalism 103. Prerequisite: Journalism 50–51. Nonmajor students require consent of instructor.

3 units, winter quarter (WEIGLE, CHURCHILL) Lec. MW 8; Lab. by arrangement

109. Editorial Techniques III.—Practice in advanced news writing for the newspapers and the radio-TV. Prerequisites: Journalism 50–51 and junior standing. Open only to majors. The course is conducted in co-operation with the Palo Alto *Times*.

2 units, spring quarter (WEIGLE, CHURCHILL) Lab. by arrangement

115. Advertising I.—An introduction to advertising, including fundamentals of marketing, consumer research, media, copy, and layout.

3 units, autumn quarter (CHURCHILL) MWF 11

116. Advertising II.—Analysis of advertising campaigns in marketing and public relations. Advanced practice in copy writing, media selection, and retail advertiser service. Open only to majors. Prerequisite: Journalism 115.

3 units, winter quarter (CHURCHILL) MWF 11

120. The Media of Mass Communication I.—The media are examined from these points of view: content, audience, control, and effect; with emphasis on the newspaper and its ethics.

3 units, autumn quarter (WEIGLE) MWF 10

140. History of Anglo-American Journalism.

3 units, autumn quarter (WEIGLE) TTh 8

4 units, summer quarter (BRINTON) By arrangement

150. Forms of Journalistic Writing.—Practice in writing magazine articles, editorials, and critical essays, with emphasis on marketing manuscripts. Conferences. Prerequisites: senior standing, and Journalism 50–51 or consent of instructor.

3 units, autumn quarter (CHURCHILL) TTh 10

4 units, summer quarter (BRINTON) TTh 10

152. Magazine Editorial Techniques.—Planning, writing, and production are studied with editors of *Sunset Magazine* and of other periodicals. Prerequisite: Journalism 150 and consent of instructor.

3 units, spring quarter (CHURCHILL) By arrangement

156. Media Management.—Principles of business operation of newspapers, magazines, and radio-TV, with emphasis on the revenue factors. Nonmajor students require consent of instructor.

3 units, spring quarter (CHURCHILL) By arrangement

169. Legal Aspects of Journalism.—The law of libel, contempt, constitutional guaranties, privacy, copyright, and inspection of public records.

3 units, spring quarter (BRINTON) TTh 8

175. Reporting of Public Affairs.—The reporting of local, state, and federal courts and municipal, state, and federal administration in the local community. Open only to major students with senior standing.

4 units, winter quarter (DEUTSCHMANN) MWF 10

199. Individual Work.—Major students with high academic standing are permitted to undertake individual work in such fields as Women's Departments, Industrial Journalism, and a few other specialized fields in which courses are not offered.

1 or 2 units, any quarter (STAFF) By arrangement

GRADUATE COURSES

211. Communication and Persuasion.—An analysis of the experimental literature that relates to credibility, susceptibility, retention of opinion change, and other aspects of the effect of communication.

3 units, winter quarter (BUSH) T 3–5

217a. Media and Opinion Measurement. The basic sampling procedures associated with the study of public opinion, the audiences of the mass media, and markets.

3 units, winter quarter (BRINTON) TTh 1

217b. Media and Opinion Measurement.—Experimental design, questionnaire construction, interviewing, and administration of surveys; content analysis. Field work is required. Prerequisite: Journalism 217a.

4 units, spring quarter (BUSH) MWF 1

220. The Media of Mass Communication II.—Open only to graduate students. Students who have had Journalism 120 will register for 2 units.

4 units, autumn quarter (BUSH) TTh 11, W 2–4

255. The Foreign Press and International Communications.

4 units, summer quarter (———) [Not given in 1954–55]

299. Advanced Individual Work.—Graduate students majoring in journalism may supplement their work in certain Upper Division courses with individual projects of a distinctly advanced order.

1 to 5 units, any quarter (STAFF) By arrangement

300. Thesis.

(STAFF) By arrangement

309. Directed Graduate Research.—Research in connection with a staff project done in lieu of the master's thesis.

(STAFF) By arrangement

PRACTICE COURSES

121. Advanced Practice.—Practice work in executive positions on the editorial or business staff of *The Stanford Daily*, with weekly conferences. Open to undergraduate students, technically enrolled in the Upper Division, who qualify by election or appointment; not open to graduate students. Students are limited to a total of 7 units of credit. Credit in this course may *not* be offered in fulfillment of journalism unit requirements for degrees in journalism.

1 to 2 units, each quarter (STAFF) By arrangement

183. San Francisco Newspaper Practice.—Journalism majors who have made a high record in their entire program, and especially in Journalism 175, are permitted to work in San Francisco in the senior year, and by arrangement with San Francisco newspapers. The work is done under the supervision of specially appointed San Francisco newspapermen and the faculty of the Institute.

5 units, spring quarter (WEIGLE) By arrangement

[**Curriculum and Instruction in Journalistic Writing.**—See Education 285.]

MATHEMATICS

WILLIAM ALBERT MANNING, GEORGE POLYA, Professors Emeriti

MENAHEM M. SCHIFFER, HAROLD MAILE BACON, STEFAN BERGMAN, ALBERT HOSMER BOWKER, CHARLES LOEWNER, MAX SHIFFMAN, GABOR SZEGÖ, Professors
PAUL R. GARABEDIAN, JOHN G. HERRIOT, HALSEY L. ROYDEN, Associate Professors
DAVID GILBARG, Visiting Associate Professor
GORDON E. LATTA, Assistant Professor
PAUL W. BERG, JOHN MCCARTHY, MARY VIRGINIA SUNSERI, Acting Assistant Professors

Courses Primarily for Lower Division Students.—These consist of introductory courses in analytic geometry, and differential and integral calculus.

Students intending to graduate with mathematics as their major subject are required to take Courses 10, 11, 21, 22, 23, and 24 (or Courses 41, 42, 43, and 24). These courses should be taken while students are in the Lower Division, preferably during the first year. Such students are advised to begin or continue the study of French or German in the first year.

Courses 10, 11, 21, 22, 23, and 24, or Courses 41, 42, 43, and 24 are provided also for students in other departments who need or desire mathematics above the level of secondary school work.

Students electing either one of the series of calculus courses (10, 11, 21, 22, 23, 24), (41, 42, 43, 24) are expected to complete the work in that series. Changes from one series to another are permitted only by special arrangement.

Honors sequences in Lower Division Mathematics: Mathematics 52, 53, and 54 will be an honors course in calculus for students intending to major in the physical sciences. These courses will cover the material contained in Mathematics 42, 43, and 24, but students who take this sequence will need to spend less time on drill, and consequently it will be possible to explore some of the interesting implications of calculus in science, engineering, and mathematics. Prerequisites: Mathematics 41 and the consent of the instructor.

Mathematics 62, 63, and 64 is a calculus sequence intended for students who are not majoring in one of the physical sciences. Roughly parallel to Mathematics 42 and 43, Mathematics 62 and 63 with their emphasis on concepts will be suitable for a general education honors program. Mathematics 64 corresponds to Mathematics 24 with particular attention to topics needed for economics and statistics. This sequence is designed to provide the social scientist with a background for advanced mathematics and statistics courses. Prerequisites: Philosophy 1 and the consent of the instructor.

Requirements for Degrees.—For the general University requirements for the various degrees see the *Information Bulletin.* Candidates with a major in mathematics must also meet the departmental requirements listed below.

Graduation.—Candidates for graduation with mathematics as their major subject must, in addition to the requirements for Lower Division students listed above, take one quarter of Advanced Calculus (100), two quarters of Algebra (119, 120), two quarters of Differential Equations (130, 131), two quarters of Fundamental Concepts of Analysis (115, 116), one quarter of Vector Analysis (113), one quarter of Higher Geometry (142), and in addition enough courses selected from groups II or III to make a total of 36 units of credit in this group. By special permission, the student may substitute (120, 121) for (119, 120),

175. Reporting of Public Affairs.—The reporting of local, state, and federal courts and municipal, state, and federal administration in the local community. Open only to major students with senior standing.
4 units, winter quarter (DEUTSCHMANN) MWF 10

199. Individual Work.—Major students with high academic standing are permitted to undertake individual work in such fields as Women's Departments, Industrial Journalism, and a few other specialized fields in which courses are not offered.
1 or 2 units, any quarter (STAFF) By arrangement

GRADUATE COURSES

211. Communication and Persuasion.—An analysis of the experimental literature that relates to credibility, susceptibility, retention of opinion change, and other aspects of the effect of communication.
3 units, winter quarter (BUSH) T 3–5

217a. Media and Opinion Measurement. The basic sampling procedures associated with the study of public opinion, the audiences of the mass media, and markets.
3 units, winter quarter (BRINTON) TTh 1

217b. Media and Opinion Measurement.—Experimental design, questionnaire construction, interviewing, and administration of surveys; content analysis. Field work is required. Prerequisite: Journalism 217a.
4 units, spring quarter (BUSH) MWF 1

220. The Media of Mass Communication II.—Open only to graduate students. Students who have had Journalism 120 will register for 2 units.
4 units, autumn quarter (BUSH) TTh 11, W 2–4

255. The Foreign Press and International Communications.
4 units, summer quarter (———) [Not given in 1954–55]

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300. Thesis.
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309. Directed Graduate Research.—Research in connection with a staff project done in lieu of the master's thesis.
(STAFF) By arrangement

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121. Advanced Practice.—Practice work in executive positions on the editorial or business staff of *The Stanford Daily*, with weekly conferences. Open to undergraduate students, technically enrolled in the Upper Division, who qualify by election or appointment; not open to graduate students. Students are limited to a total of 7 units of credit. Credit in this course may *not* be offered in fulfillment of journalism unit requirements for degrees in journalism.
1 to 2 units, each quarter (STAFF) By arrangement

183. San Francisco Newspaper Practice.—Journalism majors who have made a high record in their entire program, and especially in Journalism 175, are permitted to work in San Francisco in the senior year, and by arrangement with San Francisco newspapers. The work is done under the supervision of specially appointed San Francisco newspapermen and the faculty of the Institute.
5 units, spring quarter (WEIGLE) By arrangement

[**Curriculum and Instruction in Journalistic Writing.**—See Education 285.]

MATHEMATICS

WILLIAM ALBERT MANNING, GEORGE POLYA, Professors Emeriti

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DAVID GILBARG, Visiting Associate Professor
GORDON E. LATTA, Assistant Professor
PAUL W. BERG, JOHN MCCARTHY, MARY VIRGINIA SUNSERI, Acting Assistant Professors

Courses Primarily for Lower Division Students.—These consist of introductory courses in analytic geometry, and differential and integral calculus.

Students intending to graduate with mathematics as their major subject are required to take Courses 10, 11, 21, 22, 23, and 24 (or Courses 41, 42, 43, and 24). These courses should be taken while students are in the Lower Division, preferably during the first year. Such students are advised to begin or continue the study of French or German in the first year.

Courses 10, 11, 21, 22, 23, and 24, or Courses 41, 42, 43, and 24 are provided also for students in other departments who need or desire mathematics above the level of secondary school work.

Students electing either one of the series of calculus courses (10, 11, 21, 22, 23, 24), (41, 42, 43, 24) are expected to complete the work in that series. Changes from one series to another are permitted only by special arrangement.

Honors sequences in Lower Division Mathematics: Mathematics 52, 53, and 54 will be an honors course in calculus for students intending to major in the physical sciences. These courses will cover the material contained in Mathematics 42, 43, and 24, but students who take this sequence will need to spend less time on drill, and consequently it will be possible to explore some of the interesting implications of calculus in science, engineering, and mathematics. Prerequisites: Mathematics 41 and the consent of the instructor.

Mathematics 62, 63, and 64 is a calculus sequence intended for students who are not majoring in one of the physical sciences. Roughly parallel to Mathematics 42 and 43, Mathematics 62 and 63 with their emphasis on concepts will be suitable for a general education honors program. Mathematics 64 corresponds to Mathematics 24 with particular attention to topics needed for economics and statistics. This sequence is designed to provide the social scientist with a background for advanced mathematics and statistics courses. Prerequisites: Philosophy 1 and the consent of the instructor.

Requirements for Degrees.—For the general University requirements for the various degrees see the *Information Bulletin.* Candidates with a major in mathematics must also meet the departmental requirements listed below.

Graduation.—Candidates for graduation with mathematics as their major subject must, in addition to the requirements for Lower Division students listed above, take one quarter of Advanced Calculus (100), two quarters of Algebra (119, 120), two quarters of Differential Equations (130, 131), two quarters of Fundamental Concepts of Analysis (115, 116), one quarter of Vector Analysis (113), one quarter of Higher Geometry (142), and in addition enough courses selected from groups II or III to make a total of 36 units of credit in this group. By special permission, the student may substitute (120, 121) for (119, 120), Functions of a Complex Variable (206a) for (113), and Differential Geometry (143a) for (142).

Advanced Degrees.—Candidates for the degree of Master of Science in mathematics will be expected to complete, in addition to the requirements for the Bachelor's degree, the equivalent of 45 units of work in the University, of which 30 must be in this department. This work shall include a thesis and Mathematics 190. Candidates are expected to have a reading knowledge of French and German sufficient to read mathematical papers in these languages.

In order for a student to be admitted to candidacy for the Ph.D. degree, he must have successfully completed Mathematics 121, 190, 205a, b, and 206a, b, together with 24 additional units of graduate courses (i.e., courses numbered 200 and above), and must have demonstrated the ability to read French or German. In addition, he must pass an oral examination given by the department.

In addition to the requirements for candidacy, the student must complete an approved program of study including a minimum of 30 units of graduate courses, pass his second language examination and the University oral examination, and submit a dissertation acceptable to the department and the University Committee on Graduate Study. A student must receive a grade of B or better in a course in order for that course to satisfy the requirements for the Ph.D. degree.

For further information concerning degree programs, requirements for a Ph.D. minor in mathematics, fellowships and assistantships, inquire of the department secretary.

The Teacher's Recommendation.—The requirements for a teaching major in mathematics for the General Secondary Credential are: Courses 10, 11, 21, 22, 23, 24 (or 41, 42, 43, 24) together with 21 units selected from Group II, and in addition, 15 units selected from Group II or in courses in other departments requiring extensive application of mathematics. The requirements for a teaching minor in mathematics are Courses 10, 11, 21, 22, 23, 24 (or 41, 42, 43, 24) together with 9 units selected from Group II, and in addition, 3 units selected from Group II or in courses in other departments requiring extensive application of mathematics. In order to receive the recommendation of the department for a teaching major or a teaching minor, the candidate is expected to have an average grade of B in these required courses. Attention is called to Courses 110, 111, and 129 as particularly appropriate to these programs.

I. COURSES PRIMARILY FOR LOWER DIVISION STUDENTS

[Note.—The courses in this group will be offered only if ten or more students enroll.]

A. Algebra.—Fundamental laws: negative and fractional power; quadratic equations, curve plotting, logarithms, the binomial theorem, complex numbers.
3 units, autumn, *winter, and *spring quarters (———) MTWThF 2, 10

C. Plane Trigonometry.—Trigonometric functions; identities and equations; solution of right triangles and oblique triangles including the use of logarithms; applications to practical problems; De Moivre's theorem. Continuation in this course depends upon the student's passing a placement examination given during the first week of the course and covering algebra.
3 units, autumn, *winter, and *spring quarters (———) MTWThF 2, 10

10. Analytic Geometry and Calculus.—Geometry of the straight line; function; limit; continuity; derivative, slope of a curve; differentiation of algebraic functions; maximum, minimum, inflection points; simple curve tracing. Continuation in this course depends upon the student's passing a placement

examination given during the first week of the course and covering algebra and plane trigonometry. Prerequisites: Algebra and Plane Trigonometry.
3 units, autumn, *winter, and *spring quarters (———) (autumn) MWF 8, 10, 1, 2
(winter) MWF 10, 1, 2
(spring) MWF 2

11. Analytic Geometry and Calculus.—Continuation of Course 10. Locus; translation and rotation of axes; conics; tangent and normal parametric representation.
3 units, autumn, *winter, and *spring quarters (———) (autumn) TThS 8
(winter) MWF 8, 10, 1, 2
(spring) MWF 10, 1, 2

21. Analytic Geometry and Calculus.—Continuation of Course 11. Applied maxima and minima; rates; differentiation of trigonometric, inverse trigonometric, logarithmic, exponential, and hyperbolic functions; differentials; curvature; motion; polar co-ordinates.
3 units, autumn, *winter, and *spring quarters (———) (autumn) TThS 8; MWF 3
(winter) TThS 10
(spring) MWF 8, 10, 1, 2

22. Analytic Geometry and Calculus. — Continuation of Course 21. Theorem of the Mean; indeterminate forms; Taylor's Theorem; formal integration; definite integral; areas.
3 units, autumn, *winter, and *spring quarters (———)
(autumn) MWF 8, 12, 1; TThS 10
(winter) TThS 8; MWF 3
(spring) TThS 10

23. Analytic Geometry and Calculus.—Continuation of Course 22. Analytic Geometry of space; application of the definite integral to finding volumes, arc length, mean value, work, centroid, fluid pressure, moment of inertia; partial derivatives.
3 units, autumn, *winter, and *spring quarters (———) (autumn) TThS 10
(winter) MWF 8; TThS 10, 1, 3
(spring) TThS 8; MWF 3

24. Analytic Geometry and Calculus.—Continuation of Course 23. Partial derivatives; multiple integrals; infinite series; expansion of functions in power series; introduction to differential equations.
3 units, autumn and *spring quarters (———) (autumn) MWF 8
(spring) MWF 8, 12

41. Analytic Geometry and Calculus.—Courses 41, 42, and 43 together cover the same subjects as Courses 10, 11, 21, 22, and 23. The requirements for admission to Course 41 are the same as for Course 10.
5 units, autumn and *winter quarters (BACON) MTWThF 9

42. Analytic Geometry and Calculus.—Continuation of Course 41.
5 units, winter and *spring quarters (BACON) MTWThF 9

43. Analytic Geometry and Calculus.—Continuation of Course 42. The student will complete the Analytic Geometry and Calculus sequence by taking Course 24 after 43.
5 units, spring quarter (BACON) MTWThF 9

52. Calculus.—Honors version of Course 42 for students who intend to major in one of the physical sciences. Prerequisites: Mathematics 41, and consent of the instructor.
5 units, winter quarter (SCHIFFER) MTWThF 9

53. Calculus.—Honors version of Course 43.
5 units, spring quarter (SCHIFFER) MTWThF 9

54. Calculus.—Honors version of Course 24.
3 units, autumn quarter (SCHIFFER) [Not given in 1954–55]

62. Calculus.—Honors course for students who do not intend to major in one of the physical sciences. Topics considered: Functions, limit, continuity; differential calculus. Prerequisites: Philosophy 1, and consent of the instructor.
5 units, winter quarter (SUPPES) MTWThF 1

63. Calculus.—Continuation of Course 62. Definite and indefinite integrals, integration of standard form.
5 units, spring quarter (SUPPES) MTWThF 1

64. Calculus.—Continuation of Course 63. Partial derivatives, multiple integrals, constrained maxima and minima.
3 units, autumn quarter [Not given in 1954–55]

II. COURSES PRIMARILY FOR UPPER DIVISION AND GRADUATE STUDENTS

[NOTE.—The courses in this group presuppose a knowledge of Calculus.]

100. Advanced Calculus.—Topics in the study of functions of several variables, including partial differentiation, Taylor's series, maxima and minima with side conditions, Jacobians, implicit function theorem, Lagrange multipliers, transformation of multiple integrals, surface-integrals, Gamma function, elliptic integrals.
5 units, autumn quarter (———) TThS 9

106. Introduction to Functions of a Complex Variable.—Complex numbers, analytic functions, Cauchy-Riemann equations, complex integration, and the Cauchy formula; elementary conformal mappings.
3 units, autumn quarter (PÓLYA) MWF 3

110. Selected Topics from Elementary Geometry.—Special emphasis on methods of solution and presentation. Recommended for teaching certificate.
3 units, winter quarter (BACON) [Not given in 1954–55]

111. Mathematical Methods in Science.—Setting up scientific and technical problems in mathematical terms; differential equations. Use of physical suggestions in solving mathematical problems. Recommended for teaching certificate in mathematics and science.
3 units, winter quarter (SCHIFFER) [Not given in 1954–55]

113. Vector Analysis.—Vector algebra and calculus, vector fields, Stokes' theorem, divergence theorem, curvilinear co-ordinates, applications to potential theory and mathematical physics.
3 units, winter quarter (HERRIOT) TThS 9

114. Matrix Theory.—Determinants and matrices, operations with matrices, characteristic roots and vectors, linear and quadratic forms, transformations, canonial forms, applications.
3 units, spring quarter (LOEWNER) MWF 10

115. Fundamental Concepts of Analysis. — Rigorous treatment of such topics as real numbers, limits, function, continuity, differentiability, integral, infinite series, and other infinite processes for students who have had elementary calculus. The course is especially recommended for students who intend to major in mathematics or to work for advanced degrees.
3 units, winter quarter (HERRIOT) MWF 10

116. Fundamental Concepts of Analysis. — Continuation of Course 115.
3 units, spring quarter (HERRIOT) MWF 10

119. Theory of Equations. — Complex numbers, polynomials; Euclid's algorithm, roots of algebraic equations, roots of unity, algebraic solution of cubic and biquadratic equations; determinants and systems of linear equations.
3 units, autumn quarter (BERG) MWF 1

120. Modern Algebra.—Matrices, linear vector spaces, linear transformations; group theory; fields, rings, and ideals with applications to algebraic number theory.
3 units, winter quarter (BERG) MWF 1

121. Modern Algebra.—Continuation of Course 120.
3 units, spring quarter (BERG) MWF 1

123. Theory of Probability.—Concept of probability; the theorems of total and compound probabilities. Concepts of random variable, expected value, variance and covariance; corresponding rules. Continuous probability distributions, concept of density of probability. Binomial distribution and its limiting cases; normal distribution and Poisson distribution. Outline of general limit theorem. Stress is laid on intuitive and practical illustrations from various domains. (Same as Economics 270, and Statistics 116.)
4 units, autumn quarter (CHERNOFF) MTWF 9

129. Elementary Mathematics and the Higher Point of View.—Special emphasis on methodical and historical points, and ideas of broader scientific interest. Recommended for teaching certificate.
3 units, summer quarter (———) [In alternate years; not given in 1953–54]

130. Ordinary Differential Equations.—Special equations, exact equations, linear equations; series solutions, numerical solution; Laplace transform and operational methods. Courses 130, 131, and 132 form a sequence.
3 units, autumn quarter (BACON) MWF 8, 11

131. Partial Differential Equations I.—Boundary value problems for the wave and heat equations; separation of variables, Fourier series, Bessel functions.
3 units, winter quarter (GARABEDIAN, HERRIOT) MWF 8, 11

132. Partial Differential Equations II.—Boundary value problems for Laplace's equation; Legendre polynomials, spherical harmonics, Poisson integral formula, Green's functions.
3 units, spring quarter (GARABEDIAN, SHIFFMAN) MWF 8, 11

137. Numerical Methods.—Numerical solution of algebraic transcendental equations and systems of equations, interpolation, finite differences, numerical integration, numerical solution of differential equations, least squares. Prerequisite: Mathematics 24 or equivalent.
3 units, autumn quarter (HERRIOT) MWF 11

138. Numerical Methods.—Continuation of Course 137.
3 units, winter quarter (HERRIOT) MWF 11

139. Theory and Operation of Computing Machines.—Study of modern computing machines of intermediate complexity, particularly punched card machines. Programing of typical problems from statistics and the natural sciences.
3 units, spring quarter (HERRIOT) MWF 11

142. Higher Geometry.—Homogeneous and projective co-ordinates with applications; projective correspondence in forms of one dimension; involution; projective correspondence in forms of two dimensions; collineations and their classification; correlation and polarity; projective, affine, and metric properties of conics.
3 units, spring quarter (BACON) MWF 8

143a. Differential Geometry.—The theory of space curves and surfaces; Gauss curvature, intrinsic invariants, geodesics.
3 units, autumn quarter (LOEWNER) TTh 10 (and one hour by arrangement)
[In alternate years; given in 1954–55]

143b. Differential Geometry.—Continuation of Course 143*a*. Selected topics, including foundations of Riemannian geometry.
3 units, winter quarter (LOEWNER) TTh 10 and 1 dhr
[In alternate years; given in 1954–55]

152a. Elementary Theory of Numbers.—Euclid's algorithm and the fundamental theorems on divisibility; prime numbers; congruence of numbers; theorems of Fermat, Euler, and Wilson; congruence of the first and higher degrees; Lagrange's theorem and its applications; residues of power; quadratic residues; introduction to the theory of binary quadratic forms.
3 units, autumn quarter (LATTA) [In alternate years; not given in 1954–55]

152b. Elementary Theory of Numbers.—Continuation of Course 152*a*.
3 units, winter quarter (LATTA) [In alternate years; not given in 1954–55]

157. Non-Euclidean Geometry.—A study of hyperbolic and elliptic plane geometry and trigonometry.
3 units, autumn quarter (LOEWNER) [In alternate years; not given in 1954–55]

170. Elementary Tensor Calculus.—Fundamental operations; covariants; contravariants. Some applications of the Ricci calculus to mathematical physics. Prerequisite: Mathematics 113.
3 units, spring quarter (———) [In alternate years; not given in 1954–55]

190. Proseminar.—The objective of the proseminar is to give candidates for the M.S. and Ph.D. degrees a first introduction into independent study and research. The work in the proseminar consists of solving problems from various branches of mathematics which are not of routine type, but which do not require a broad knowledge of the subject. The students are further introduced into reading and presenting research papers of a more elementary character. The proseminar is a prerequisite for the M.S. degree and the University oral examination required for the Ph.D. It is expected to be taken during the senior year of undergraduate study or by new graduate students during the first quarter of graduate study. Mathematics 190 may be repeated for credit.
3 units, autumn and spring quarters (STAFF) MW 4–5:30

III. COURSES PRIMARILY FOR GRADUATE STUDENTS

200a, b. Advanced Course in Ordinary Differential Equations.—Fundamental existence theorems; successive approximations, Cauchy-Lipschitz method, power series solutions in the complex domain; zeros and singularities; asymptotic behavior and stability; Sturm-Liouville problems.
3 units, autumn quarter (LATTA) MWF 2
[In alternate years; given in 1954–55]

201. Calculus of Variations.—Maxima and minima of integrals, Euler-Lagrange equation, applications to geometry and mechanics; second variation, sufficient conditions.
3 units, spring quarter (GILBARG) MWF 2

203. Potential Theory.—Single and double layer potentials; first and second boundary value problems; selected topics from subharmonic functions, Fredholm integral equation, Dirichlet's principle, domain functions.
3 units, autumn quarter (LOEWNER) [In alternate years; not given in 1954–55]

204a. Integral Equations.—Neumann series, Fredholm theory with applications; Volterra equation; resolvent kernel; symmetric kernels, eigenfunctions and eigenvalues, series developments in eigenfunctions, with application to the theory of vibration; singular kernels, non-linear equations.
3 units, winter quarter (LOEWNER) [In alternate years; not given in 1954–55]

204b. Integral Equations.—Continuation of Course 204*a*.
3 units, spring quarter (LOEWNER) [In alternate years; not given in 1954–55]

205a. Theory of Functions of a Real Variable.—Properties of point sets, Lebesgue measure, Lebesgue and Stieltjes integrals, function of bounded variation, absolute continuity. Prerequisite: Mathematics 116.
3 units, autumn quarter (ROYDEN) MWF 9

205b. Theory of Functions of a Real Variable.—Point set theory; metric spaces and Banach spaces, convergence in the mean; linear functionals.
3 units, winter quarter (ROYDEN) MWF 9

205c. Theory of Functions of a Real Variable.—Advanced theories of measure and integration.
3 units, spring quarter (ROYDEN) MWF 9

206a. Theory of Functions of a Complex Variable.—Calculus of residues, power series, analytic continuation, conformal mapping. Prerequisite: Mathematics 106.
3 units, winter quarter (SZEGÖ) MWF 3

206b. Theory of Functions of a Complex Variable. — Continuation of Course 206*a*.
3 units, spring quarter (SZEGÖ) MWF 3

207. Fourier Series.—Convergence of Fourier series; Cesaro and Abel summation; Riesz-Fischer theorem. Prerequisite: Mathematics 205*a*.
3 units, autumn quarter (HERRIOT) [In alternate years; not given in 1954–55]

208a. Topology.—Fundamental notion of point set and combinatorial topology; homology theory of complexes and compact spaces; applications and connections with analysis; degree of a mapping, fixed points, critical points.
3 units, autumn quarter (SHIFFMAN) [In alternate years; not given in 1954–55]

208b. Topology.—Continuation of Course 208*a*.
3 units, winter quarter (SHIFFMAN) [In alternate years; not given in 1954–55]

209a, b, c. Advanced Partial Differential Equations.—Classification of partial differential equations according to type; characteristics, successive approximations and Riemann method for hyperbolic equations, parabolic equations; fundamental solutions, Green's functions, maximum principle and Dirichlet problem for elliptic equations.
3 units, autumn, winter, and spring quarters (GARABEDIAN) MWF 1
[In alternate years; given in 1954–55]

210. Galois Theory.—Field extensions and Galois groups, Jordan decomposition and solvability, the symmetric group and the insolvability of the quintic by radicals. Prerequisite: Mathematics 121.
3 units, spring quarter (SCHIFFER) [In alternate years; not given in 1954–55]

211. Theory of Sets.—(Same as Philosophy 211.)
3 units [Not given in 1954–55]

212. Seminar.—Introduction to the study of modern literature, with discussions and presentations by the members of the class. The seminar is primarily for students who are working for advanced degrees.
2 units, autumn, winter, and spring quarters [Given every year]

213. Mathematical Logic.—(Same as Philosophy 201.)
3 units, spring quarter (MCNAUGHTON) By arrangement

251. Geometric Function Theory.
3 units By arrangement

252a, b, c. Orthogonal Polynomials.
3 units, autumn, winter, and spring quarters (SZEGÖ) By arrangement

253. Spectral Theory.
3 units By arrangement

254a, b. Continuous Groups.
3 units, autumn and winter quarters (LOEWNER)
TTh 11 and one hour by arrangement

255. Analytic Theory of Numbers.
3 units By arrangement

256. Asymptotic Expansions.
3 units By arrangement

257. Advanced Topics in Calculus of Variations.
3 units By arrangement

258. Theory of Games.
3 units By arrangement

259. Seminar in Hydrodynamics.
3 units, winter quarter (BERGMAN) By arrangement

260. Advanced Reading and Research.—When in the opinion of the department a student is prepared to undertake advanced reading or research not connected with a formal course, such reading or research will be directed by a member of the department.
By arrangement

MUSIC

Warren D. Allen, Organist, and Professor of Music and Education, Emeritus

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William L. Crosten, Professor of Music
Putnam C. Aldrich, Leonard G. Ratner, Sandor Salgo, Harold C. Schmidt, Associate Professors of Music
Herbert B. Nanney, University Organist and Assistant Professor of Music
W. Leonard Beck, Acting Assistant Professor of Music and Education
Edward E. Colby, Music Librarian and Instructor in Music
Stanislas Bem, Teaching Associate in Violoncello
Otto Schulmann, Teaching Associate in Voice.
Rosalie Speciale, Teaching Associate in Piano
Julius E. Shuchat, Director of Bands

The Major Program in Music.—The offerings of the department are divided into four main areas of study: (1) music theory and composition; (2) history and literature of music; (3) musical performance; (4) music education. In the interests of a well-rounded training in music, the first three of these branches are represented in every major student's program of work.

Music in General Education.—It is the belief of the University that the study of music can be a profitable experience for the general student as well as for the person who wishes to specialize in the subject; hence the curriculum contains courses with few or no prerequisites as well as the major sequence of studies. Courses numbered 1, 2, 3, 7, and 21 are designed particularly for those whose previous experience in music is limited.

Applied Music.—Courses in applied music numbered 12, 72, and 172 are offered without extra fee, but registration is limited to students enrolled concurrently in at least one of the department's major sequence courses in music theory or history.

Practice rooms are available on the campus.

Composers' Workshop.—Meetings are held periodically for the performance and criticism of student works and for discussion of problems faced by young composers.

Scholarships.—Special scholarships in music are open each year to students of outstanding ability, and are awarded upon recommendation of the music department. Music students are also eligible to apply for any of the general, unrestricted University scholarships listed in the *Information Bulletin.*

Teaching Assistantships.—The department nominates a number of graduate students each year for appointment as teaching assistants. The stipend varies with the amount of service that is required.

DEGREE OF BACHELOR OF ARTS

With the exceptions noted below under the heading "General Secondary Credential Candidates," the departmental requirements for the degree of Bachelor of Arts with a major in music are as follows:

I. *Theory of Music:* 11, 21, 22, 23, 24, 26, 121, 122, 126

II. *Literature and History:* 40, 41, 42, and at least three of the advanced history courses which list Music 42 as prerequisite.

III. *Musical Performance:*

a) All students are required to demonstrate a minimum proficiency in piano, which is interpreted to mean the ability to play satisfactorily one of the easier movements from the Clementi Sonatinas. This requirement should be fulfilled by the beginning of the junior year. Piano proficiency examinations will be held during the first week of each quarter.

b) *Ensemble:* At least six quarters of work elected from courses numbered 160, 161, 162, 163, 164, 165, 171.

Prospective major students should plan to complete at least Music 11, 21, 22, and 26 during their Lower Division years.

Music majors will be expected to maintain a grade-point average of at least 2.5 in music courses.

General Secondary Credential Candidates.—Students preparing for the General Secondary Credential may apply 7 units of work in music education toward fulfillment of the departmental requirements for the A.B. degree. Such work will be accepted as substitution for Music 126 (3 units) and one advanced course in music history (4 units).

Foreign Language.—It is recommended that major students acquire a reading knowledge of French or German. This is particularly important if the student expects to do graduate study in music.

Honors Program.—An Honors Program in Humanities is offered for majors in this department who wish to supplement their departmental major by a related and carefully guided program of studies. See Humanities (Special Programs) for a description of the Honors Program.

DEGREE OF MASTER OF ARTS

To attain graduate standing in music, students must have completed the equivalent of the department's requirements for the Bachelor of Arts degree. Deficiencies in this regard must be made up, even though the applicant holds an A.B. degree. Prospective students should file with the department as early as possible a complete transcript of record showing the previous work done in music and in allied fields. A placement examination will be given each student prior to his initial registration, in order to determine the character and scope of his previous training and to serve as an aid in planning a program of study.

Residence.—At least three quarters of full-time study in residence are necessary. Credit for graduate study done elsewhere cannot be applied toward this minimum residence requirement.

Study Program.—Each candidate must complete a program of at least 40 units based on the graduate courses offered by the department. At the discretion of the departmental adviser, the program may also include certain courses given in other departments. An average grade of B or better must be maintained in music courses.

1. Basic Requirements: All students must include the following work in their programs:

Music 200. Music Bibliography (2 units)
Music 221a, b. Seminar in Music Theory (6 units)
Music 240. Seminar in Music History (two quarters, 8 units)

Participation in some branch of musical performance.

2. Individual Research or Creative Projects: In addition to fulfilling the basic course requirements, each student must complete an individual project in research or composition. The areas in which research may be pursued are:

a) music theory
b) history and aesthetics of music
c) performance practice

Students will enroll for this work in either Music 202 (Master of Arts Research) or Music 223 (Seminar in Composition).

Foreign Language Requirement.—Demonstrate a reading knowledge of French, German, or Italian, and a comprehension of the principal musical terms encountered in one of these languages. The student should take this test prior to enrollment in Music 200 or 240.

Application for Candidacy.—Admission to courses of advanced standing does not imply admission to candidacy for the Master's degree. Before application for candidacy may be made, the student must:

1. Complete satisfactorily at least one quarter of work in residence.
2. Demonstrate proficiency in one branch of musical performance in addition to fulfilling the department's minimum requirement in piano.
3. Satisfy the departmental language requirement.

Thesis.—The department has no general thesis requirement. However, a student may elect to offer a thesis if that seems appropriate to his interests or needs, in which case it may be counted for 6 units of credit.

DEGREE OF DOCTOR OF PHILOSOPHY

Music students with superior qualifications who wish to work for the Ph.D. degree are referred to the Graduate Division Special Programs, page 98.

SPECIAL DEGREES FOR TEACHERS

In co-operation with the School of Education, the Department of Music offers work leading to the following degrees:

Master of Arts in the Teaching of Music (designed for active teachers in secondary school music)
Doctor of Education with a concentration in music

In both of these degree programs the student normally will take about one-third of his work in education and two-thirds in music. Further information concerning these degree requirements may be obtained by writing the Department of Music.

TEACHING CREDENTIALS

Students in the department may work for the General Secondary Credential or the Junior College Credential with a teaching-major or teaching-minor in music. Details may be obtained from the credential secretary of the School of Education.

MUSICAL ORGANIZATIONS

As an integral part of its program the department offers diversified opportunities for experience in musical performance. The University's musical organizations include the band, orchestra, chorus, choir, and numerous chamber music ensembles. Each of these presents several public concerts, both on and off the campus, during the year. Membership in these organizations is not limited to students who register in the courses for credit, and, unless otherwise stated, is open to both men and women.

A maximum of 12 units for ensemble performance may be credited toward graduation. These units may be earned entirely in one course or divided among two or more courses (160, 161, 162, 163, 164, 165, 171).

COURSES FOR THE GENERAL STUDENT

1. Introduction to Music.—The aims of the course are to enlarge the student's acquaintance with music and to develop his ability to listen intelligently to it. No prerequisites.
3 units, any quarter (DEPARTMENT FACULTY)

2. Symphony.—A study of symphonic works selected from the mid-eighteenth century to the present. Prerequisite: Music 1, or equivalent.
3 units (SALGO)

3. Opera.—A study of operas selected from Mozart to the present. Prerequisite: Music 1, or equivalent.
3 units (CROSTEN)

7. The Concerto.—A study of concertos selected from Bach to the present. Prerequisite: Music 1, or equivalent.
3 units (SALGO)

MUSIC THEORY AND COMPOSITION

11a, b, c. Music Listening and Reading Skills.—Sight-singing, dictation, and reading in the different clefs. To be completed by the junior year. Required for majoring in music, unless waived by passing an attainment examination on the materials covered in the course.
2 units, autumn, winter, and spring quarters (BECK)

21, 22. Elementary Harmony.—Basic rhythmic and harmonic materials. The relation of rhythm and harmony to musical form. Written exercises, analysis, and ear-training dealing with procedures based on classic style. No prerequisites.
4 units, winter and spring quarters (NANNEY)

23, 24. Intermediate Harmony.—Interchange of mode; study of modulation in normal and extended period forms; written exercises, analysis, and ear-training. Prerequisite: Music 22.
4 units, autumn and winter quarters (NANNEY)

26. Tonal Counterpoint.—A study of polyphony based on eighteenth-century harmonic practice leading to the writing of simple inventions. Prerequisite: Music 22.
4 units, spring quarter (ALDRICH)

121, 122. Advanced Harmony.—Harmonic materials of the nineteenth and early twentieth centuries. Prerequisite: Music 24.
3 units, autumn and winter quarters (RATNER)

123. Composition.—Individual projects in creative work. May be repeated for a total of 9 units. Prerequisites: Music 122, and permission of instructor.
3 units, any quarter (RATNER)

124. Music Theory Review.—Review of the principles of harmony and counterpoint and their relation to musical form. Some attention will be given to the pedagogical problems of teaching theory. For students who have done previous work in theory.
4 units, summer quarter (———)

126. Advanced Counterpoint.—Prerequisites: Music 24 and 26.
3 units, spring quarter (RATNER)

127, 128. Orchestration.—Offered in alternate years. Prerequisite: Music 122, or equivalent.
3 units, autumn and winter quarters (———)

HISTORY AND LITERATURE OF MUSIC

40, 41, 42. History of Music.—Styles of musical expression from the beginning of the Christian era to the present. Prerequisite: Music 22.
3 units, autumn, winter, and spring quarters (CROSTEN, SCHMIDT, RATNER)

Advanced studies in musical style and analysis

The following courses will be offered in rotation over a two-year period, and as a rule, two will be given in each quarter:

140. Music in the Renaissance.
140a. Sacred Music in the Renaissance.
4 units (SCHMIDT)
140b. Secular Music in the Renaissance.
4 units (ALDRICH)

141. Music of the Baroque Period.
141a. The Aesthetics of Baroque Style.
4 units (ALDRICH)
141b. Baroque Keyboard Music.
4 units (ALDRICH)
141c. Baroque Ensemble Music.
4 units (ALDRICH)

142. Music of the Classic Period.
142a. 18th Century Classic Forms.
4 units (RATNER)
142b. Classic Opera.
4 units (CROSTEN)
142c. The String Quartets of Beethoven.
4 units (RATNER)

143. Music of the Romantic Period.
143a. Orchestral Music in the 19th Century.
4 units (SALGO)
143b. Opera in the 19th Century.
4 units (CROSTEN)

144. Music of the Modern Period.
144a. Survey of 20th Century Music.
4 units (RATNER)
144b. Contemporary Chamber Music.
4 units (RATNER)

150. Comparative Studies in Opera.
4 units (CROSTEN)

151. Comparative Studies in Choral Music.
4 units (SCHMIDT)

199. Individual work.—For advanced Upper Division or graduate students who wish to do special work in fields not covered by the regular curriculum. Projects for study must be specific and must be submitted for approval before registration in the course. The work will be supervised by some member of the department for credit not to exceed 4 units per quarter.
Any quarter (DEPARTMENT FACULTY) By arrangement

INDIVIDUAL PERFORMANCE STUDIES

12. Introductory Piano.
1 unit, autumn, winter, and spring quarters (BECK, SPECIALE)

72. Vocal and Instrumental Instruction.
1 unit, autumn, winter, and spring quarters
72a. Piano (CROSTEN, NANNEY, SPECIALE)
72b. Violin (SALGO)
72c. Viola (SALGO)
72d. Violoncello (BEM)
72e. Contrabass (———)
72f. Harpsichord (ALDRICH)
72g. Organ (NANNEY)
72h. Voice (SCHULMANN)

170. Studies in Performance Practice.—Individual projects concerned with the realization of style concepts in performance.
2 units (DEPARTMENT FACULTY)

172. Advanced Vocal and Instrumental Instruction.
1 unit, autumn, winter, and spring quarters (DEPARTMENT FACULTY)

ENSEMBLE STUDIES

All courses listed in this section may be repeated for credit. An audition is required for admission to any University musical organization. Audition schedules will be announced in advance of the registration period. Except in unusual cases, it is expected that members will remain with the organizations throughout the year.

160. University Orchestra.
1 unit, autumn, winter, and spring quarters (SALGO) MTh 7:15 p.m.

161. University Band.—A marching band open only to men will be formed in the autumn quarter. In the winter and spring quarters it will become a concert band with membership open to both men and women.
1 unit, autumn, winter, and spring quarters (SHUCHAT)
T 7:15–9 p.m. (and one hour by arrangement)

162. University Chorus.
1 unit, autumn, winter, and spring quarters (SCHMIDT) M 4–5:30; W 7–8:30 p.m.

163. University Choir.—The official choir of Memorial Church, which furnishes music for the Sunday services and for special occasions in the church calendar. A group of eight members chosen by audition may receive an honorarium for performing duties other than those required of the regular Choir.
2 units, any quarter (SCHMIDT) T 5–5:45; Th 7–8:30 p.m., and Sunday 10–12 a.m.

164. University Singers.
1 unit, autumn, winter, and spring quarters (NANNEY) By arrangement

165. Stanford Chorale.
164 and 165 are small ensembles devoted to the performance of vocal chamber music.
1 unit, autumn, winter, and spring quarters (SCHMIDT) By arrangement

171. Chamber Music.—Open to any student with sufficient technical ability to play in combinations for strings, wind instruments, and piano.
1 unit, any quarter (SALGO)

MUSIC EDUCATION

88a, b. Elementary School Music.—The basic musical experiences in the elementary school and their relationship to the general elementary curriculum.
3 units, winter and spring quarters (BECK)

130. Conducting (Orchestral).—Score reading and analysis, baton technique, interpretation. Prerequisite: Music 128, or equivalent.
3 units (SALGO) (Given in alternate years to Music 131)

131. Conducting (Choral).—Essentials of choral conducting, problems of enunciation, tone production, and choral style. Prerequisites: Music 22 and 42, or equivalent.
3 units (SCHMIDT)

181. Curriculum and Instruction in Secondary School Music.
4 units, winter quarter (BECK)

182. Keyboard Musicianship for Secondary Teachers.—Keyboard harmony; transposition; improvisation; sight reading. Prerequisites: Music 24, and completion of minimum departmental requirement in piano.
3 units, spring quarter (BECK)

183. Group Singing in Secondary Schools.—Techniques of tone production; choice of materials; reading from 2, 3, and 4-part vocal scores; conducting; simple song transposition; treatment of the changing voice; organization of choral work in schools. Prerequisites: Music 182, and at least three quarters of participation in a university choral group.
3 units, autumn quarter (BECK)

184. The Teaching of Band and Orchestral Instruments.
184a. Stringed Instruments.
1 unit, autumn quarter (SALGO)
184b. Woodwind Instruments.
1 unit, winter quarter (SHUCHAT)
184c. Brass and Percussion Instruments.
1 unit, spring quarter (SHUCHAT)

185. Instrumental Performance in Secondary Schools.—Orchestration and conducting adapted to the potentialities of high school instrumental groups. Prerequisite: Music 184*a*, *b*, *c*.
3 units, winter quarter (SHUCHAT)

186. Teaching General Music in the Secondary Schools.—Basic concepts and techniques of music taught in the secondary school through the avenues of listening, writing, and performing. Prerequisites: Music 182, 183, 184, 185.
3 units, autumn quarter (BECK)

GRADUATE COURSES

200. Music Bibliography.—The use of bibliographical materials in graduate study and introduction to methods of research.
2 units, autumn quarter (COLBY)

201. Master of Arts Thesis.
Any quarter (DEPARTMENT FACULTY) By arrangement

202. Master of Arts Research.
4 units, any quarter (DEPARTMENT FACULTY)

221. Seminar in Music Theory.
221a. Advanced Practical Studies in Music Theory.
3 units, autumn quarter (RATNER)
221b. Readings in Music Theory.
3 units, winter quarter (RATNER)

223. Seminar in Composition.—May be repeated for a total of 12 units.
4 units, any quarter (RATNER)

240. Seminar in Music History.—Historical studies in musical style and aesthetics. May be repeated for credit.
4 units, autumn and winter quarters (ALDRICH, CROSTEN)

281. Seminar in Secondary School Music.
4 units (BECK) By arrangement

299. Individual Work.—For advanced graduate students with the permission of the Department of Music. Credit not to exceed 4 units per quarter.
Any quarter (DEPARTMENT FACULTY) By arrangement

300a, b, c. Seminar in Musical Notation.
4 units, autumn, winter, and spring quarters (ALDRICH) [Not given in 1954–55]

302. Doctoral Research in Musicology.
Any quarter (ALDRICH, CROSTEN, RATNER) By arrangement

PHILOSOPHY

JOHN DAVID GOHEEN, JOHN ROBERT REID, Professors
JOHN LELAND MOTHERSHEAD, JR., Associate Professor
JEFFERY SMITH, Associate Professor of Humanities and Philosophy
ARNOLD ISENBERG, Acting Associate Professor
DONALD H. DAVIDSON, ROBERT MCNAUGHTON, PATRICK C. SUPPES, Assistant Professors
CLARENCE I. LEWIS, Lecturer

Courses in philosophy give the student a knowledge of major philosophical ideas as they have developed historically and in terms of their contemporary analysis. The historical courses listed below emphasize change and development of philosophical ideas over a period of time, whether in the form of a widespread movement or the intellectual history of an individual philosopher. Other courses, such as those in systematic philosophy (cf. the listing which follows), or, in some instances, in the single work of a philosopher, emphasize the analysis, clarification, and elaboration of ideas. In recognition of the fact that philosophy gains significance as it draws from and contributes to other fields of human interest and knowledge, the programs of all philosophy majors will be planned to include courses outside the department.

Students interested in selecting courses related to their major field should consult with members of the department for advice.

Bachelor of Arts.—An undergraduate majoring in philosophy shall outline, in consultation with his adviser, a program of study designed to give him a broad background and, at the same time, a sound understanding of some particular branch of philosophy.

The major program will consist of a minimum of 60 units, 40 units of which shall be within the department and, at least, 15 units outside the department. All majors are required to take Philosophy 1, 2 or 5, 100, and 102.

Suggested programs:

1. *Epistemology*: A student concentrating in epistemology (theory of knowledge) is required to take Philosophy 1, 2 or 5, 100, 102, and 184; three of the following: 105, 121, 145, 147, 160, 164, 182, 186, 202, 204. At least one of these courses shall be drawn from the group: 160, 164, 202, 204. In addition, Psychology 51; and one of the following: Psychology 101, 102, 130, 209, 210.

2. *History of Ideas*: A student concentrating in the history of ideas is required to take Philosophy 1, 2 or 5, 100, 101, 102, 104, and 105. In addition, he shall select for special study (1) a period of philosophy and (2) the major writing or writings of a philosopher. At least 20 units shall be devoted to the work under (1) and (2). This requirement can be met in part by certain courses in Classics, History, English, other language departments, the social sciences, the Honors Program in Humanities, and Education.

3. *Logic and the Philosophy of Science*: A student concentrating in logic or the philosophy of science should take Philosophy 1, 2, 100, 102, 160, 164, 204, and either Mathematics 62, 63, 64 or Mathematics 41, 42, 43. In addition, the student concentrating in logic should take two of the following: Philosophy 184, 201, 202, 205, 211, and three of the following: Mathematics 115, 116, 121, 122, 152*a*, 152*b*, 157, 205*a*, 208*a*, 208*b*. The student concentrating in the philosophy of science should take one of the following: Philosophy 184, 201, 202, 203, 205, and either three of the following: Physics 51, 53, 55, 57, or three of the following: Statistics 50, Economics 1, 2, 100.

4. *Theory of Value*: A student concentrating in theory of value is required to take Philosophy 1, 2 or 5, 100, 102, 170, 172, 174; one of the following: 176, 178, 179, and one of the following: 175, 180, 192. In addition, he shall select,

183. Group Singing in Secondary Schools.—Techniques of tone production; choice of materials; reading from 2, 3, and 4-part vocal scores; conducting; simple song transposition; treatment of the changing voice; organization of choral work in schools. Prerequisites: Music 182, and at least three quarters of participation in a university choral group.
3 units, autumn quarter (BECK)

184. The Teaching of Band and Orchestral Instruments.
184a. Stringed Instruments.
1 unit, autumn quarter (SALGO)
184b. Woodwind Instruments.
1 unit, winter quarter (SHUCHAT)
184c. Brass and Percussion Instruments.
1 unit, spring quarter (SHUCHAT)

185. Instrumental Performance in Secondary Schools.—Orchestration and conducting adapted to the potentialities of high school instrumental groups. Prerequisite: Music 184*a*, *b*, *c*.
3 units, winter quarter (SHUCHAT)

186. Teaching General Music in the Secondary Schools.—Basic concepts and techniques of music taught in the secondary school through the avenues of listening, writing, and performing. Prerequisites: Music 182, 183, 184, 185.
3 units, autumn quarter (BECK)

GRADUATE COURSES

200. Music Bibliography.—The use of bibliographical materials in graduate study and introduction to methods of research.
2 units, autumn quarter (COLBY)

201. Master of Arts Thesis.
Any quarter (DEPARTMENT FACULTY) By arrangement

202. Master of Arts Research.
4 units, any quarter (DEPARTMENT FACULTY)

221. Seminar in Music Theory.
221a. Advanced Practical Studies in Music Theory.
3 units, autumn quarter (RATNER)
221b. Readings in Music Theory.
3 units, winter quarter (RATNER)

223. Seminar in Composition.—May be repeated for a total of 12 units.
4 units, any quarter (RATNER)

240. Seminar in Music History.—Historical studies in musical style and aesthetics. May be repeated for credit.
4 units, autumn and winter quarters (ALDRICH, CROSTEN)

281. Seminar in Secondary School Music.
4 units (BECK) By arrangement

299. Individual Work.—For advanced graduate students with the permission of the Department of Music. Credit not to exceed 4 units per quarter.
Any quarter (DEPARTMENT FACULTY) By arrangement

300a, b, c. Seminar in Musical Notation.
4 units, autumn, winter, and spring quarters (ALDRICH) [Not given in 1954–55]

302. Doctoral Research in Musicology.
Any quarter (ALDRICH, CROSTEN, RATNER) By arrangement

PHILOSOPHY

JOHN DAVID GOHEEN, JOHN ROBERT REID, Professors
JOHN LELAND MOTHERSHEAD, JR., Associate Professor
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ARNOLD ISENBERG, Acting Associate Professor
DONALD H. DAVIDSON, ROBERT MCNAUGHTON, PATRICK C. SUPPES, Assistant Professors
CLARENCE I. LEWIS, Lecturer

Courses in philosophy give the student a knowledge of major philosophical ideas as they have developed historically and in terms of their contemporary analysis. The historical courses listed below emphasize change and development of philosophical ideas over a period of time, whether in the form of a widespread movement or the intellectual history of an individual philosopher. Other courses, such as those in systematic philosophy (cf. the listing which follows), or, in some instances, in the single work of a philosopher, emphasize the analysis, clarification, and elaboration of ideas. In recognition of the fact that philosophy gains significance as it draws from and contributes to other fields of human interest and knowledge, the programs of all philosophy majors will be planned to include courses outside the department.

Students interested in selecting courses related to their major field should consult with members of the department for advice.

Bachelor of Arts.—An undergraduate majoring in philosophy shall outline, in consultation with his adviser, a program of study designed to give him a broad background and, at the same time, a sound understanding of some particular branch of philosophy.

The major program will consist of a minimum of 60 units, 40 units of which shall be within the department and, at least, 15 units outside the department. All majors are required to take Philosophy 1, 2 or 5, 100, and 102.

Suggested programs:

1. *Epistemology*: A student concentrating in epistemology (theory of knowledge) is required to take Philosophy 1, 2 or 5, 100, 102, and 184; three of the following: 105, 121, 145, 147, 160, 164, 182, 186, 202, 204. At least one of these courses shall be drawn from the group: 160, 164, 202, 204. In addition, Psychology 51; and one of the following: Psychology 101, 102, 130, 209, 210.

2. *History of Ideas*: A student concentrating in the history of ideas is required to take Philosophy 1, 2 or 5, 100, 101, 102, 104, and 105. In addition, he shall select for special study (1) a period of philosophy and (2) the major writing or writings of a philosopher. At least 20 units shall be devoted to the work under (1) and (2). This requirement can be met in part by certain courses in Classics, History, English, other language departments, the social sciences, the Honors Program in Humanities, and Education.

3. *Logic and the Philosophy of Science*: A student concentrating in logic or the philosophy of science should take Philosophy 1, 2, 100, 102, 160, 164, 204, and either Mathematics 62, 63, 64 or Mathematics 41, 42, 43. In addition, the student concentrating in logic should take two of the following: Philosophy 184, 201, 202, 205, 211, and three of the following: Mathematics 115, 116, 121, 122, 152*a*, 152*b*, 157, 205*a*, 208*a*, 208*b*. The student concentrating in the philosophy of science should take one of the following: Philosophy 184, 201, 202, 203, 205, and either three of the following: Physics 51, 53, 55, 57, or three of the following: Statistics 50, Economics 1, 2, 100.

4. *Theory of Value*: A student concentrating in theory of value is required to take Philosophy 1, 2 or 5, 100, 102, 170, 172, 174; one of the following: 176, 178, 179, and one of the following: 175, 180, 192. In addition, he shall select,

in consultation with his adviser, a group of courses relating to one of the following fields: aesthetics and art criticism, ethics, social and political theory, the philosophy of law, or the philosophy of religion. This requirement may be met in part by certain courses in Art, Classics, Education, Economics, English and the other languages, History, the Humanities Honors Program, Political Science, Psychology, and the social sciences.

Master of Arts.—1. A candidate for the Master's degree must have completed as an undergraduate or take as a graduate the following courses or their equivalents:

a) Epistemology: one of the following: 182, 184, 202
b) History of ideas: 100, 101, 102
c) Logic and the philosophy of science: 160
d) Theory of value: 170

2. The candidate must submit an acceptable thesis, the plan for which must be approved by the department early in his candidacy. A maximum of 9 units' credit will be allowed for work on the thesis.

3. The candidate will normally be expected to complete a total of at least 45 units, of which 40 units must be within the department, including the units granted for work on the thesis.

Minor in Philosophy for the Degree of Doctor of Philosophy.—Each student will arrange an individual program in consultation with the department.

Doctor of Philosophy.—A few students will be accepted as candidates for the degree of Doctor of Philosophy in philosophy. Within the general University regulations laid down in the *Information Bulletin*, the department will plan a course of study and research for each candidate. For details of the requirements, the student should consult the department.

HONORS AND GRADUATE HONORS PROGRAMS IN HUMANITIES

An Honors Program in Humanities is offered for philosophy majors who wish to supplement their departmental work for the A.B. degree by a related and carefully guided program of studies. See pages 209–211, under Special Programs in Humanities, for a description of the Honors Program.

The Department of Philosophy participates in the Graduate Honors Program in Humanities leading to the Ph.D. degree. For a description of that program, and fellowships offered in connection with it, see pages 211–212.

ELEMENTARY COURSES

1. Introduction to Logic.—An introduction to the methods and principles of formal logic. The course will explore the modern techniques of deduction and indicate how these can be applied in such fields as philosophy and the exact sciences.

5 units, autumn quarter (SUPPES, MCNAUGHTON) MTWThF 1 (Th or F section)
5 units, *winter quarter (MCNAUGHTON) MTWThF 11 (Th or F section)
5 units, *summer quarter (first half) (———) MTWThFS 10–12

2. Introduction to Ethics.—An introduction to the study of human values, the grounds of reasonable choice and standards of right and wrong. Problems of ethics will be examined in the light of materials drawn from such fields as psychology, sociology, and politics as well as from the works of philosophers.

5 units, winter quarter (DAVIDSON) MTWThF 1 (Th or F section)
5 units, *spring quarter (———) MTWThF 1 (Th or F section)

3. Introduction to Critical Thinking.—A course in the analysis and criticism of thought, its presuppositions, its methods, and its objectives. The problems of meaning, validity, and truth are viewed as central and practical

applications are stressed. Illustrative materials are drawn chiefly from the humanities, the social sciences, and everyday life.
4 units, spring quarter (Reid) MTWTh 11

5. Introduction to Philosophy.—An introductory survey of the principal problems with which philosophy deals. Emphasis is placed on the conflicts in points of view which result from the attempts to deal with these problems and on the practical consequences of the various solutions offered. Prerequisite: sophomore standing.
5 units, autumn quarter (Mothershead) MTWThF 10 (Th or F section)
5 units, *winter quarter (Goheen) MTWThF 10 (Th or F section)
5 units, *spring quarter (Isenberg) MTWThF 10 (Th or F section)

10. The Philosophy of Interpersonal Relations.—A course in applied philosophy. It deals, through Socratic discussion, with the problems of self-knowledge and the knowledge of others, the determinants and criteria of choice, and the role of unconscious factors in interpersonal relations—with special reference to the influence of these factors upon efforts to gain security, power, freedom, approval, and love. The aim of the course is to integrate relevant materials from diverse fields, ranging from anatomy through psychoanalysis, and to indicate their bearing upon the pursuit of values in everyday life.
4 units, autumn quarter (Reid) MTWTh 9

11. Values in Everyday Life.
4 units, winter quarter (Reid) MTWTh 2

ADVANCED COURSES

I. History of Philosophy from Ancient Times to the Present

[One elementary course in philosophy is the general prerequisite for advanced courses. Additional prerequisites are stipulated where necessary.]

100. Greek Philosophy.—Characterization of the historical situation in which science and philosophy began. The rise of critical thought. Early metaphysical speculation. The sophists and Socrates. Post-Socratic ethical schools. The philosophies of Plato and Aristotle.
4 units, autumn quarter (Goheen) MTWTh 11

101. Philosophy from Aristotle to the Seventeenth Century.—The Stoics, Epicureans, and Skeptics. Neo-Platonism and the struggle of Greek philosophy and Christianity. St. Augustine and early Christian philosophy. Early medieval thought. St. Thomas Aquinas and the rise of scholasticism in the thirteenth century. William of Occam and the nominalist attack on scholasticism. The decentralization of philosophic thought in the Renaissance. Prerequisite: Philosophy 100, or equivalent.
4 units, winter quarter (Mothershead) MTWTh 11

102. Modern Philosophy.—Francis Bacon and the new scientific empiricism. The materialism of Thomas Hobbes. The philosophic systems of Descartes, Spinoza, and Leibniz. Locke, Berkeley, Hume, and the philosophy of the Enlightenment. The philosophy of Immanuel Kant. Prerequisite: a total of two philosophy courses. Philosophy 101 is recommended.
4 units, spring quarter (Mothershead) MTWTh 11

104. Philosophic Background of Contemporary Thought.—This course will attempt to uncover the fundamental beliefs operative today and to study their development in the philosophy of the recent past. With the aim of providing background for the understanding of contemporary thought as its guiding principle, the course will begin with a consideration of romanticism and idealism in the early nineteenth century and proceed historically to the early twentieth century. Prerequisite: a total of two philosophy courses. Philosophy 102 is recommended.
4 units, winter quarter (Mothershead) MTWTh 9

105. Contemporary Philosophy.—This course is designed to introduce the student to some of the principal developments in contemporary philosophical thinking. Prerequisite: a total of two philosophy courses. Philosophy 104 is recommended.
4 units, spring quarter (ISENBERG) MTWTh 3

II. COURSES IN THE PHILOSOPHY OF A PERIOD

112. Medieval Philosophy.—A study of the major medieval thinkers. Readings in the course will include such writers as Augustine, Maimonides, and Aquinas.
3 units [Not given in 1954–55]

117. Philosophy and Science in the Seventeenth and Eighteenth Centuries.—The rise of mechanical theories of nature. Relation of philosophy to early development of modern science. Controversies over the nature of space, time, and matter; views of Galileo, Descartes, Newton, Leibniz, Boscovich, and Kant on these issues.
4 units, spring quarter (SUPPES) MTWTh 9

121. British Empiricism.—An analysis of the foundations and some of the problems of British empiricism. Readings and discussions are based mainly on selections from the writings of Bacon, Locke, and Berkeley.
4 units [Not given in 1954–55]

124. Continental Rationalism.—A critical study of the methods and results of philosophic rationalism as exemplified by the systems of Descartes, Spinoza, and Leibniz.
4 units [Not given in 1954–55]

125. Modern Chinese Thought.
By arrangement
[Not given in 1954–55]

127. American Philosophy.—A study of the main currents of American philosophical thought. Some of the readings and lectures in the course will concern early American thinkers, but the main emphasis will be on nineteenth- and twentieth-century developments.
4 units, winter quarter (GOHEEN) MTWTh 9

III. COURSES IN INDIVIDUAL PHILOSOPHERS OR WORKS

135. The Philosophy of Plato.—Prerequisite: Philosophy 100, or equivalent.
4 units [Not given in 1954–55]

137. The Philosophy of Aristotle.—Reading (in English translation) and class discussion of a number of the basic philosophical writings of Aristotle. Prerequisite: Philosophy 100, or equivalent.
4 units, winter quarter (GOHEEN) MF 3–5

139. The Philosophy of Augustine.—A study of the philosophy of Augustine. Readings in the *Confessions* and *City of God.*
4 units [Not given in 1954–55]

140. Philosophy of Aquinas.—The study of some of the basic philosophical distinctions in the philosophy of Thomas Aquinas. Readings in *Summa Theologica, Part I,* will be discussed in detail.
4 units, spring quarter (GOHEEN) MTWTh 3

143. The Philosophy of Spinoza.—Prerequisite: Philosophy 102, or equivalent.
4 units [Not given in 1954–55]

145. The Philosophy of David Hume.—Prerequisite: Philosophy 102, or equivalent.
4 units [Not given in 1954–55]

147. The Philosophy of Kant.—An analysis of the *Critique of Pure Reason.* Prerequisite: Philosophy 102, or equivalent.
4 units [Not given in 1954–55]

149. The Philosophy of William James.—Reading and discussion of his principal philosophical works. The course will be conducted as a pro-seminar. Members of the class will take turns in leading the discussion.
4 units [Not given in 1954–55]

152. The Philosophy of John Dewey.—Critical appraisal, in the light of recent developments in contemporary philosophy, of Dewey's pragmatism. *Human Nature and Conduct, Experience and Nature,* and parts of his other philosophical works will be studied.
4 units, winter quarter (REID) MTWTh 2

IV. SYSTEMATIC PHILOSOPHY

160. Intermediate Logic.—Development of the propositional calculus and the lower functional calculus. Consideration of decision procedures, questions of consistency, completeness, and independence. Prerequisite: Philosophy 1, or permission of instructor.
4 units, winter quarter (MCNAUGHTON) MTWTh 1

164. Philosophy of Science.—Elementary application of set-theoretical and axiomatic methods to the empirical sciences. Particular emphasis on the logic of measurement and the structure of scientific theories. Some discussion of the theory of rational behavior. Prerequisite: Philosophy 1.
4 units, winter quarter (SUPPES) MTWTh 2

168. Philosophy of History.—A study of major philosophies of history with special reference to their bearing on contemporary events.
4 units [Not given in 1954–55]

170. Theory of Value.—Definitions of "value"; the psychological and social conditions of different values; the function of value judgments; the nature of standards and their role in criticism—in art, science, and morals. Value theory, so conceived, is concerned with the foundations of the normative disciplines, i.e., logic, ethics, and aesthetics; for it attempts to supply the rationale of our activity whenever we engage in the characteristically human search for justification.
4 units, winter quarter (LEWIS) MTWTh 1

172. Types of Moral Philosophy.—A consideration of the various principles which are employed for distinguishing between right and wrong, the reasons which may be given for adopting one or more of these principles, and the consequences which follow from such adoption. Emphasis will be placed on the ethical theories underlying the moral beliefs by which people live today, such as utilitarianism, Marxist ethics, ethical idealism, and the ethics of John Dewey.
4 units, autumn quarter (MOTHERSHEAD) MTWTh 9

174. Aesthetics.—Analysis of aesthetic experience and artistic expression, and of their role in the development of human experience and of understanding. Some attention will be given to philosophical problems arising in the attempt to formulate and apply standards of art criticism.
4 units, spring quarter (SMITH) MTWTh 9

175. The Philosophy of Criticism.—Theories of aesthetic value. The verifiability of critical judgments. The resolution of conflicts of taste. Problems of form and content. The problem of expression in the fine arts.
4 units, winter quarter (ISENBERG) MTWTh 9

176. Social Philosophy.—A study of alternative social attitudes and ideals in the light of the conceptions of nature and of human nature to which they are related.
4 units, winter quarter (SMITH) MTWTh 10

178. Political Philosophy.—A study of the principal theories of state and society. The relations of political theory to ethics and other spheres of value will be discussed. Political values will be considered in light of the general theory of value.
4 units (Goheen) [Not given in 1954–55]

180. The Philosophy of Religion.—A critical and sympathetic philosophical inquiry into some aspects of religious experience and belief.
4 units, autumn quarter (Smith) MTWTh 2

182. Metaphysics.—Several typical metaphysical systems will be studied. Special attention will be given to the analysis of the nature of metaphysical knowledge.
4 units, spring quarter (Goheen) MTWTh 10

184. Theory of Knowledge.—A systematic analysis of the central problems of epistemology. Idealism, phenomenalism, pragmatism, empiricism, realism as theories of knowledge will be discussed in the light of contemporary developments.
4 units, spring quarter (Davidson) MTWTh 2

186. Theory of Mind.—A logical analysis of some problems which are of increasing importance in current psychological and medical theory, such as the distinction between mind and body, the meaning of organism-as-a-whole, and the concept of psychogenesis, with special emphasis on the methodological questions involved, as well as something of the wider clinical and social significance of these matters generally.
4 units, autumn quarter (Reid) MTWTh 11

188. Philosophy of Psychotherapy.—A study of the methods and goals of psychotherapy, with special reference to the logical and ethical problems involved. While the emphasis is clinical, teacher-student, husband-wife, parent-child, as well as doctor-patient relations will be discussed from the standpoint of modern dynamic psychiatry.
4 units, spring quarter (Reid) MTWTh 1

192. Ideas in Literature.—This course will explore the ways in which philosophical ideas receive literary expression. Readings in such authors as Homer, the Greek dramatists, Augustine, Dante, Montaigne, Marlowe, Shakespeare, Milton, Wordsworth, Hardy, Kafka, Eliot, Joyce.
4 units, spring quarter (Davidson) MTWTh 1

199. Seminar in Recent Philosophical Literature.—Reading and discussion of recent important books and articles in various topics in philosophy. Open to Upper Division students with consent of the instructor.
4 units [Not given in 1954–55]

[**Senior Seminar in Humanities.**—See Humanities 193.]

GRADUATE COURSES

201. Mathematical Logic.—Modern results concerning the incompleteness of certain formal systems; decidable and undecidable systems. **Prerequisite:** Philosophy 160, or equivalent. (Same as Mathematics 213.)
3 units, spring quarter (McNaughton) By arrangement

202. Theory of Meaning.
3 units, winter quarter (Davidson) By arrangement

203. Methodological Problems: Psychology.—Critique of theory construction and postulational methods in psychology, with emphasis on theories of learning. Discussion of intervening variables, hypothetical constructs, and dispositional concepts. Prerequisite: permission of instructor.
3 units [Not given in 1954–55]

204. Induction and the Theory of Rational Behavior.—Axiomatic development of probability; survey of recent work in confirmation theory. Discussion of the traditional problem of induction in the light of recent work on rational behavior in the theory of games and the theory of statistical decisions. Prerequisite: Philosophy 1 or permission of the instructor.
3 units, spring quarter (SUPPES) MWF 10

205. Foundations of Mechanics.—Axiomatic development of classical and relativistic particle mechanics and classical rigid body mechanics; precise definition of the notion of invariance; representation theorem for rigid body mechanics. Problems of axiomatization in other branches of physics. Prerequisite: working knowledge of the calculus. Philosophy 1 recommended.
3 units [Not given in 1954–55]

211. Foundations of Set Theory.—A study of intuitive set theory, including the theory of the transfinite numbers. The axiom of choice and the continuum hypothesis. Some account of axiomatic set theory. (Same as Mathematics 211.)
3 units [Not given in 1954–55]

215. The Later Dialogues of Plato.
3 units [Not given in 1954–55]

220. Seminar in Formal Value Theory.—Application of formal methods to problems of value theory in philosophy and the social sciences. Foundations of utility theory in economics and related problems in the theory of measurement as applied to psychology and sociology.
3 units, autumn quarter (DAVIDSON, SUPPES) MWF 2

240. Individual Work.
Each quarter (DEPARTMENT FACULTY) By arrangement

250. Thesis.
(DEPARTMENT FACULTY) By arrangement

299. Advanced Seminar in Recent Philosophical Literature.
4 units, spring quarter (LEWIS) By arrangement

[**Philosophy of Language.** See Graduate Division Special Programs 310.]

PHYSICAL SCIENCES (GENERAL PROGRAM)

CLAUDIO ALVAREZ-TOSTADO, Associate Professor
DONALD E. LEE, Instructor

Physical Sciences Subcommittee: Claudio Alvarez-Tostado, Paul H. Kirkpatrick, Konrad B. Krauskopf (Chairman), Philip A. Leighton.

Candidates for the degree of Bachelor of Science in Physical Sciences–General Program will be required to take Chemistry 1, 2, 3, Mathematics 41, 42, 43, Mineral Sciences G1, G2, Physics 21, 22, 23, 24, 28, 29, or their equivalents, and 45 additional units of work in chemistry, physics, mathematics, geology, or related fields, the average grade for the above courses being at least "C," and to have or acquire a reading knowledge of French or German. Programs of study must be approved by an adviser, appointed by the chairman of the Physical Sciences subcommittee.

Candidates for the degree of Master of Science in Physical Sciences–General Program are expected to complete, in addition to the general residence and other requirements of the University for that degree, a program of study which has been approved by an adviser assigned by the chairman of the Physical Sciences subcommittee. A reading knowledge of French or German is required. The program of study will involve (1) an acceptable thesis; (2) the satisfactory completion of at least 30 units of advanced work in physics, chemistry, mathematics, geology, or related fields, and (3) such other advanced work in the University, making a total of at least 45 units, as may be approved by the staff.

COURSES OF INSTRUCTION

1, 2, 3. Physical Sciences.—A survey of the physical sciences as an expanding field of knowledge. Lectures, demonstrations, and laboratory work will be given in the various divisions, such as astronomy, chemistry, physics, and geology, with the purpose of giving a concept of the general field rather than to emphasize the separate divisions of it. Primarily for freshmen. Will meet the science requirement of the Lower Division.
3 units, autumn, winter, and spring quarters (Alvarez-Tostado, Lee)
(I) TTh 8, (II) TTh 9; Lab. by arrangement

50. Descriptive Astronomy.—A nonmathematical study of the heavenly objects with emphasis on the solar system, comets, fixed stars, and other relatively near-by systems. This course is designed especially for those students who desire only a general knowledge of astronomy. Time will be allotted for telescopic observations.
3 units, spring quarter (Lee) MWF 11

100. Physical Science and Modern Life.—A course in the methods and implications of modern science. The subject matter will include a review of important conclusions, and theories of modern science, a discussion of the methods, values, and limitations of scientific inquiry, and a survey of the relations of science to technology, economics, sociology, philosophy, and religion. Prerequisite: Upper Division standing, or consent of the instructor.
3 units, winter quarter MWF 9

140. Electron Tubes in Research.—An elementary study of electron tubes, their characteristics, and their application to control and measurement. The emphasis will be on applications with particular attention paid to photo tube and D.C. amplifier circuits. Prerequisite: Physics 23, or equivalent.
3 units, autumn quarter (Alvarez-Tostado) MWF 11

200. Master's Thesis.
Any quarter (Staff)

PHYSICS

Joseph Grant Brown, David Locke Webster, Professors Emeriti

Leonard Isaac Schiff, Felix Bloch, Marvin Chodorow, Edward Leonard Ginzton, Robert Hofstadter, Paul Harmon Kirkpatrick, Willis Eugene Lamb, Wolfgang Panofsky, Professors
Walter Ernst Meyerhof, Associate Professor
Edwin Thompson Jaynes, Acting Assistant Professor
Robert Milo Cotts, Peter Alden Franken, Jack Jordan Kraushaar, Donald Robert Yennie, Gaurang Bhaskar Yodh, Instructors

The study of physics is undertaken by three principal classes of students: those preparing for careers in professional fields such as medicine or engineering, those who wish to include physics as a part of a general education, and those preparing for teaching or research careers in physics itself. In this department the Lower Division courses are planned to serve all three of these groups. The Upper Division and graduate courses meet the needs of the third group and of students majoring in other branches of science.

Entrance Preparation.—Students who intend to major in physics are advised to offer entrance credit in as many of the following preparatory subjects as possible, which are listed approximately in order of desirability: English; mathematics (including trigonometry and solid geometry); foreign language (2 or more units of German preferred, or 3 or more units of French); biology (enough in high school to satisfy the University Lower Division requirement); chemistry; and physics. A student who has had 4 units of any foreign language may satisfy the University foreign-language requirement merely by passing an examination, but he must nevertheless meet the Lower Division Group I requirement. The student with 4 units of German is advised to fill in this requirement with French or Russian.

Requirements for Graduation.—For the recommendation of this department for the degree of Bachelor of Science, the minimum requirements are as follows: 60 units of physics and chemistry, of which at least 40 must be physics (other than 199 and 201) and at least 12 chemistry, the average grade for the 60 units being at least C; and a reading knowledge of foreign languages equivalent either to 18 quarter units of German, or 15 of German and 15 of French or Russian. (The latter option does not satisfy the University Lower Division language requirement, and is useful only to those students who have met the University requirement with a language other than German, French, or Russian.) In satisfying the requirement for physics units any of the following courses may be counted as physics: Chemistry 171, 173, 175; Civil Engineering 99, 100, 101; Electrical Engineering 143, 150, 151, 152, 160, 161, 162, 270, 271, 272; Mechanical Engineering 160. In any case, however, at least 14 of the 40 required physics units must be Upper Division or graduate courses of the Physics Department. At least four of the five general fields, mechanics, heat, light, electricity, and atomics, must be represented in the student's program by courses above the level of the 50 series.

Two possible four-year programs leading to the degree of Bachelor of Science in physics are shown below. The tabulated numbers denote quarter units. Few students will follow either program identically; many variations are possible. The prudent student will plan his course at all times a few quarters ahead, or to graduation. A prospective physics major with one entrance credit in biology and two in German may be advised to follow Program I. Program II is suggested for physics majors without biology or German entrance credits.

PROGRAM I

	First year			Second year			Third year			Fourth year		
English *2a*, *2b*	3	3	..	..	..	..	..	..	..	..	..	..
German G3, G21, G22, G23	3	3	3	3	..	..	..	..	..	..	..	..
Chemistry 1, 2, 3	..	..	..	4	4	5	..	..	..	..	..	..
Chemistry 171, 173, 175	..	..	..	..	..	..	3	3	3	..	..	..
Electrical Engineering 150, 151	..	..	..	..	..	..	..	..	..	3	3	..
Mathematics 41, 42, 43, 24	5	5	5	3	..	..	..	..	..	..	..	..
Mathematics 130, 131, 132, *206a*, *206b*	..	..	..	3	3	3	3	3	..	..	..	..
Physics 51, 55, 53	5	5	5	..	..	..	..	..	..	..	..	..
Physics 57, 91, 93	..	..	..	3	3	3	..	..	..	..	..	..
Physics 89, 194, 196	..	..	..	..	3	..	..	..	..	..	3	3
Physics 111, 113, 115	..	..	..	..	..	..	..	..	..	3	3	3
Physics 141, 173	..	..	..	..	..	..	..	3	..	3	..	..
Physics 94–101, 151, 153, 161	..	..	..	..	..	..	5	3	3	..	..	3
Physics 181, 183–185, 187	..	..	..	..	..	..	..	..	..	3	6	3
History 10, 11, 12	..	..	..	..	..	..	4	4	4	..	..	..
Social Sciences (Group III)	..	..	..	..	..	5	..	..	5	..	..	..
Elective	..	..	3	..	3	..	2	..	2	4	..	5
Totals	16	16	16	16	16	16	17	16	17	16	15	17

PROGRAM II

	First year			Second year			Third year			Fourth year		
English 2*a*, 2*b*	3	3	..	..	..	..	..	..	..	..	..	..
German G1, G2, G3, G21, G22, G23	3	3	3	3	3	3	..	..	..	..	..	..
Chemistry 1, 2, 3	..	..	..	..	..	..	4	4	5	..	..	..
Biology 1, 2, 3	..	..	..	..	..	..	3	3	3	..	..	..
Mathematics 41, 42, 43, 24	5	5	5	3	..	..	..	..	..	..	..	..
Mathematics 130, 113, 100, 131, 132	..	..	..	3	3	..	3	3	3	..	..	..
Physics 51, 55, 53, 57, 91, 93	5	5	5	3	3	3	..	..	..	..	..	..
Physics 89, 94–101, 151, 153, 111, 113, 115	..	..	..	..	3	..	5	3	3	3	3	3
Physics 173, 194, 161–196	..	..	..	..	..	..	..	..	..	3	3	6
Physics 181, 183–185, 187	..	..	..	..	..	..	..	..	..	3	6	3
History 10, 11, 12	..	..	..	..	..	..	..	..	..	4	4	4
Social Sciences (Group III)	..	..	..	..	5	5	..	..	..	..	..	..
Elective	..	..	3	3	..	5	2	3	2	3	..	..
Totals	16	16	16	15	17	16	17	16	16	16	16	16

Program I is somewhat the better for those who wish to emphasize applied physics. Important electives for such students are Physics 105 and E.E. 150, 151. In general, the elective opportunities of the suggested programs may be used for additional courses in science, mathematics, or engineering, or for work of a cultural or avocational nature. Some mathematics courses commonly elected by physics students are 113, 114, 119, 120, 123, 128, 201. Such electives are particularly recommended to students preparing for graduate work in physics.

Graduation Honors in Physics.—Graduating physics majors who complete in a creditable manner 3 units of Physics 199, and are appropriately certified by the undergraduate study committee of the Department of Physics, may graduate "With Departmental Honors."

Advanced Degrees.—Study leading to an advanced degree is possible only after the candidate has been admitted to the Graduate Division. The number admitted is strictly limited and the student should complete application by February 15, 1955, for the following fall. To obtain the degree of Master of Science or Doctor of Philosophy a number of requirements must be met, some of which are stated in a following paragraph. A more complete account of the procedures to follow and the requirements to be met may be obtained from the department secretary. The degree of Doctor of Philosophy may be obtained either in physics or in applied physics; there is no such distinction for the degree of Master of Science. For the Doctor's degree, the distinction is based both on the subject of the dissertation and on the program of courses pursued.

The degree of Master of Arts in the teaching of physics is also offered in collaboration with the School of Education; for details, applicants should consult the Physics Department secretary or the Dean, School of Education.

Each candidate for the degree of Master of Science will be required to pass an examination before the Department of Physics in the quarter in which he takes the degree; likewise each candidate for the degree of Doctor of Philosophy will be required to pass an examination before the Department of Physics prior to his oral examination by the committee appointed by the Dean of the Graduate Division. Suitable course work or a reading knowledge of German is required for the degree of Master of Science, and a good reading knowledge of German and either French or Russian is required for the degree of Doctor of Philosophy. Physics 111, 113, 115, 151, 173, 181, 183, 185, 187, 194, or their equivalents, are minimum course requirements for the degree of Master of Science; in addition, there must be at least 9 units of physics courses numbered above 200. The above-named courses together with Physics 101, 153, 161, 175, 196, 203, 221, 225, 227, 231, 233, 235, or their equivalents, are minimum course requirements for the degree of Doctor of Philosophy in physics. Candidates for this degree in applied physics must meet these course requirements with the exception of Physics 203, 225, 227, 233, and 235; additional course requirements will be arranged in consultation with the major professor, with the approval of the graduate study committee of the Department of Physics, and may include courses in engineering or other related fields.

All graduate students majoring in physics who have not qualified for the department examinations for advanced degrees, and all graduate students minoring in physics who have not completed the minor requirements, will be required to take a comprehensive examination in physics that is given annually in the spring quarter. Physics minors must also satisfy the same requirements as those for obtaining the degree of Bachelor of Science in physics.

The Teacher's Recommendation.—In its capacity as agent for the State Board of Education, the University grants credentials for teaching in California in junior and senior high schools and junior colleges. Applicants for these credentials should consult the credential secretary of the School of Education for details of the requirements in connection with the teaching of physics.

Fellowships and Assistantships.—Besides the University fellowships open to all graduates, there are available in the department a few special fellowships and several assistantships involving teaching or research. Applications for fellowships are made to the Dean of the Graduate Division, and applications for teaching assistantships to the Executive Head of the department; they must be completed by February 15, 1955. Research assistantships are usually reserved for graduate students who have been in residence for a year or more. Applications for Microwave Laboratory assistantships are made to the director of the laboratory.

Research Facilities.—Opportunities for research are available to graduate students in the fields of high energy physics, nuclear physics, nuclear induction, microwave spectroscopy, microwaves, x-rays, and theoretical physics.

The University subscribes to all the important physical journals, and the Library contains complete sets of the more important of these and of the transactions and proceedings of a number of learned societies. The more important treatises on physical subjects, in English, French, and German, and the collected papers of a number of the most eminent physicists, are also in the Library.

W. W. HANSEN LABORATORIES

The Hansen Laboratories consist of the Microwave Laboratory, directed by E. L. Ginzton, and the High Energy Physics Laboratory, directed by W. K. H. Panofsky. Several other members of the staff of the Department of Physics participate in the activities of the Laboratories: M. Chodorow, R. Hofstadter, E. T. Jaynes, and L. I. Schiff. The Laboratories offer facilities for research and instruction in the fields of high-energy physics, and microwave physics and engineering to suitably qualified students and staff members of the Departments of Physics and Electrical Engineering, and to others. Course listings are included with others offered by these two departments, and research work that can lead to the degrees of Master of Science and Doctor of Philosophy is supervised by staff members of these departments. A number of research programs are now actively under way; these deal with the properties of klystrons and related tubes, microwave measuring techniques, electronic phenomena at very high frequencies, and the design, construction, and operation of very high-energy linear electron accelerators. Of particular interest to physicists is the construction of a billion-volt accelerator now under way, and the coordinate high-energy physics research program.

LOWER DIVISION COURSES

Of the two series into which beginning courses are divided, the twenty series (21, 22, 23, 24, 28, 29) includes courses prescribed or recommended for general students and for students preparing for medicine or biology; the fifty series (51, 55, 53, 57) includes courses for students of engineering, chemistry, geology, and physics. The two series are similar in content. Both comprise demonstration lectures on fundamental principles of physics, problem work on their application to actual cases, and laboratory experiments closely correlated with the lectures. The objectives of the courses are not only to give information on particular subjects, but also to provide practice in the use of the scientific method.

Ordinarily students enrolling in the twenty series take lecture and laboratory work concurrently. In the fifty series one three-hour laboratory period and one two-hour period devoted to supervised problem work per week are parts of each course, except 57, which consists only of lectures with outside reading and homework problems.

Mechanics includes the study of motion (uniform motion, accelerated motion, rotational motion, periodic motion) and of the causes of motion or lack of it, force, momentum, work, energy, power, properties of matter, etc. Sound, heat, electricity, light, and optics are self-explanatory titles. Atomic physics deals with the experimental and scientific reasoning leading to modern ideas concerning fundamental atomic particles, atomic structure, radioactivity, x-rays, quantum theory, etc.

The twenty series comprises 13 units; the fifty series, 18. In general, topics are treated more thoroughly and with greater mathematical rigor in the fifty series than in the twenty series, and more of them are discussed. Detailed statements on curricula for which these courses are prerequisite will be found in the announcements of other departments.

21. Mechanics and Heat.—For description see above. Prerequisites: a working knowledge of elementary algebra and geometry, i.e., the ability to pass an examination in these subjects.

3 units, autumn quarter (KIRKPATRICK) Lecture sections as listed in *Time Schedule*

22. Mechanics and Heat Laboratory.—To accompany Physics 21. Prerequisites as for Physics 21.

1 unit, autumn quarter (KIRKPATRICK) Sections as listed in the *Time Schedule*

23. Electricity.—Prerequisite: Physics 21.

3 units, winter quarter (KIRKPATRICK) Lecture sections as listed in *Time Schedule*

24. Electricity Laboratory.—To accompany Physics 23. Prerequisites as for Physics 23.

1 unit, winter quarter (KIRKPATRICK) Sections as listed in the *Time Schedule*

28. Elementary Optics Laboratory.—To accompany Physics 29. Prerequisites: same as for Physics 29.

1 unit, spring quarter (KIRKPATRICK) Sections as listed in the *Time Schedule*

29. Optics and Atomics.—For description see above. Ordinarily to be accompanied by Physics 28. Prerequisite: Physics 23 or 53.

4 units, spring quarter (KIRKPATRICK) Lecture sections as listed in *Time Schedule*

51. Mechanics and Sound.—For description see above. Prerequisite: trigonometry. Previous completion of or concurrent registration in analytic geometry is also required.

5 units, autumn quarter (HOFSTADTER)
Lec., 3-hour sections as listed in *Time Schedule*
Lab., 3-hour sections as listed in the *Time Schedule*
Problem session, 2-hour sections as listed in the *Time Schedule*

53. Electricity.—Prerequisite: Physics 51. A course in calculus, completed or in progress, is required.
5 units, spring quarter (LAMB)
Lec., Lab., and problem sections as indicated under Physics 51

55. Light and Heat.—Prerequisite: Physics 51.
5 units, winter quarter (MEYERHOF)
Lec., Lab., and problem sections as indicated under Physics 51

57. Atomic Physics.—Prerequisites: Physics 53, at least one course in calculus, and preferably Physics 55. Available for graduate credit in the School of Education.
3 units, autumn and *summer quarters (JAYNES) TThS 11

89. Mechanics II.—Continuation of Physics 51, Statics, dynamics of mass point and rigid bodies, Lagrange's equations. Prerequisites: Physics 51, Mathematics 23 or 43, and preferably Mathematics 130 previously or concurrently.
3 units, winter quarter (SCHIFF) MWF 9

91. Electricity II.—Continuation of Physics 53, putting the fundamental principles on a more mathematical basis. Electrostatics, dielectrics, direct current circuits, elementary properties of thermionic tubes. These courses are designed to bridge the gap between Physics 53 and the advanced courses in electricity. Prerequisites: Physics 53 and 57, Mathematics 23 or 43.
3 units, winter quarter (FRANKEN) TThS 9

93. Electricity III.—Continuation of Physics 91, and principles of electrical measuring instruments. Specific topics will include magnetic effects of steady currents, induced currents, magnetic materials, single a.c. circuits. Prerequisites: Physics 91, Mathematics 24.
3 units, spring quarter (FRANKEN) TThS 9

94. Electrical Measurements.—Laboratory work to follow Physics 93.
2 units, autumn quarter (———) [Not given in 1954–55]

UPPER DIVISION AND GRADUATE COURSES

101. Electricity IV.—Maxwell's equations and their application to propagation, refraction, reflection, and absorption of plane waves in isotropic media. Prerequisites: Physics 93, registration in Mathematics 130.
3 units, autumn quarter (KRAUSHAAR) MWF 11

105. Physics of Solids.—The principal solid types. Free electron theory of metals. The band approximation and insulators. Semi-conductors, rectification and transistors. Prerequisite: Physics 181, or equivalent.
3 units, winter quarter (SCHIFF) MWF 11

111. Introductory Mathematical Physics I.—Lectures, assigned readings, discussions, and problems illustrating the methods of theoretical physics and introducing the student to a number of selected topics in this field. Prerequisites: Physics 89, 93, familiarity with vector methods, or Civil Engineering 101 and Electrical Engineering 270; registration in Mathematics 130.
3 units, autumn quarter (———) MWF 9

113. Introductory Mathematical Physics II.—Continuation of Course 111. Prerequisite: Physics 111, registration in Mathematics 131.
3 units, winter quarter (———) MWF 9

115. Introductory Mathematical Physics III.—Continuation of Course 113. Prerequisite: Physics 113, registration in Mathematics 132.
3 units, spring quarter (———) MWF 9

141. Electron Tubes in Physical Research.—This course is intended for those students who, anticipating experimental research, have had little or no training in electronics techniques. Specific topics will include: properties of vacuum tubes, vacuum tube equivalent circuits, resistance-coupled amplifiers, feedback, oscillators, multivibrators, scaling circuits, vacuum measurement techniques, noise, and power supplies. Prerequisites: familiarity with A.C. circuit analysis, and permission of the instructor.
3 units, winter quarter (FRANKEN) TThS 11

151. Physical Optics I.—General principles of wave motion, optical interference, interferometers, and the velocity of light, Fraunhofer and Fresnel diffraction, electromagnetic theory of light. Prerequisites: Physics 93, 101.
3 units, winter quarter (KRAUSHAAR) MWF 11

153. Physical Optics II.—Continuation of Physics 151. Dispersion, reflection and refraction of dielectrics and conductors, polarization, crystal optics, magnetoptics. Prerequisites: Physics 101, 151.
3 units, spring quarter (KRAUSHAAR) MWF 11

161. X-Rays.—An introductory course, covering methods of producing and measuring x-rays, the main features of their spectra, and the basic laws of their emission, scattering, reflection, absorption, and fluorescence. Prerequisites: calculus and Physics 153, 183.
3 units, spring quarter (———) MWF 10

173. Thermodynamics.—Derivation of the laws of thermodynamics from the impossibility of perpetual motion. Discussion of the macroscopic properties of matter as consequences of these laws. Prerequisites: Physics 53, 55, and Mathematics 24.
3 units, autumn quarter (MEYERHOF) TThS 11

175. Kinetic Theory and Introduction to Statistical Mechanics.—Kinetic theory of gases and introduction to statistical concepts in dealing with macroscopic phenomena. Applications to gases, solid bodies, and radiation phenomena. Prerequisites: Physics 57, 111, 173, and preferably registration in Physics 113.
3 units, winter quarter (MEYERHOF) TThS 11

181. Advanced Atomic Physics I.—Selected topics in modern atomic theories. The experimental basis of quantum mechanics, and its application to the spectrum of the hydrogen atom. Prerequisites: Physics 57, Physics 89 and 93 or equivalents, and registration in Mathematics 130.
3 units, autumn quarter (———) TThS 10

183. Advanced Atomic Physics II.—The vector model of the atom. Atomic, x-ray and molecular spectra. Prerequisite: Physics 181.
3 units, winter quarter (———) TThS 10

185. Nuclear Physics I.—This series (185–187) includes a study of experimental methods and results in atomic nuclei, subatomic particles, and cosmic rays. Prerequisites: Physics 57, 89, 93, preferably 181, and Mathematics 130.
3 units, winter quarter (HOFSTADTER) MWF 10

187. Nuclear Physics II.—Continuation of Course 185. Prerequisite: Physics 185.
3 units, spring quarter (HOFSTADTER) MWF 10

194. Advanced Physics Laboratory I.—This series (194–196) consists of experiments selected from the fields of optics, x-rays, and modern physics. Some independent study will be required of the student. Prerequisites: Permission of the instructor.
3 units, winter quarter (PANOFSKY) By arrangement

196. Advanced Physics Laboratory II.—Continuation of Physics 194. Prerequisite: Permission of the instructor.
3 units, spring quarter (HOFSTADTER) By arrangement

199. Independent Study.—Work in experimental or theoretical physics under the supervision of a faculty member. Prerequisites: Superior work as an undergraduate physics major, and approval of the instructor and of the undergraduate study committee of the Department of Physics.
Any quarter (ANY MEMBER OF THE DEPARTMENT) By arrangement

201. Literature of Physics.—An intensive study of the literature of any special topic in physics. The work consists chiefly in the preparation and presentation of reports upon the topics studied. Prerequisite: 25 units of college physics and permission of the instructor.
Any quarter (ANY MEMBER OF THE DEPARTMENT) By arrangement

203. Statistical Mechanics II.—Development of the concepts and methods of classical and quantum statistical mechanics; the microscopic basis for thermodynamics. Prerequisites: Physics 175, and preferably Physics 231 and Mathematics 209.
3 units, spring quarter (BLOCH) TThF 12

205. High Energy Nuclear Physics.—High energy nucleon-nucleon scattering. Nuclear reactions at high energy and the optical model. Properties of pions and muons. Interaction of pions and muons with nuclei. Introduction to cosmic ray phenomena. Prerequisites: Physics 185 and 187, or equivalent.
3 units, autumn quarter (PANOFSKY) MWF 9

206. Advanced Mechanics I.—Courses 206–207: The advanced methods for the general mechanics of particles and rigid bodies; principle of least action, Lagrange's and Hamilton's equations, contact transformations, Hamilton-Jacobi equation, perturbation theory, applications to celestial mechanics and atomic physics. Course 208: Mechanics of continuous media: elasticity, fluid dynamics, applications to surface waves, acoustics and non-linear phenomena. Prerequisites: Mathematics 132; Physics 111, 113, and 115 must be completed or in progress as this series is taken.
3 units, autumn quarter (CHODOROW) MWF 8

207. Advanced Mechanics II.—Continuation of Physics 206. Prerequisite: Physics 206.
3 units, winter quarter (CHODOROW) MWF 8

208. Advanced Mechanics III.—Continuation of Physics 207. Mechanics of continuous media. Prerequisite: Physics 207.
3 units, spring quarter (SCHIFF) MWF 8

209. Boundary Value Problems in Electromagnetic Theory.—Self-adjoint differential equations; eigenfunctions and expansion theorems. Use of Green's function, elementary applications of group theory for symmetrical structures. Approximate solutions by variational methods and perturbation theory. The methods will be illustrated by specific application to structures of practical interest. Prerequisite: Physics 221 or Electrical Engineering 272. (Same as Electrical Engineering 209*p*.)
3 units, winter quarter (JAYNES) TThS 10

210. Advanced Microwave Theory.—Continuation of Physics 209. Reduction of field theory to circuit theory, general network theorems for microwave structures, analysis in terms of scattering matrices, interconnection of multi-terminal structures, special microwave structures. Radiation from prescribed current distributions, theory of properties of materials at microwave frequencies. Prerequisite: Physics 209. (Same as Electrical Engineering 210*p*.)
3 units, spring quarter (JAYNES) TThS 10

211. Microwave Electronics I.—This series (211–212) consists of a detailed treatment of the motion of electrons in microwave devices, including beam focusing, interaction with electromagnetic fields and space-charge effects. The emphasis is on general properties of electron dynamics common to all microwave tubes. Specific types of tubes such as klystrons, traveling-wave

tubes, etc., will be treated in so far as they illustrate the general principles. Among topics included are transit time loading, space-charge waves, Llewellyn's equations, noise in beams, etc. Prerequisite: Electrical Engineering 231, or equivalent. (Same as Electrical Engineering 211*p*.)
3 units, winter quarter (CHODOROW) TThS 9

212. Microwave Electronics II.—Continuation of Physics 211. Prerequisite: Physics 211. (Same as Electrical Engineering 212*p*.)
3 units, spring quarter (CHODOROW) TThS 9

213. Microwave Measurements I.—A lecture course, which, together with Physics 214, is intended to introduce the fundamental measurement methods and instruments in the microwave region. Specific topics covered will include the measurement of impedance, power, frequency, wave-length; an experimental study of the klystron, the reflex klystron, the magnetron, and high-frequency triodes. Prerequisite: permission of instructor. (Same as Electrical Engineering 213*p*.)
2 units, autumn quarter (GINZTON) TTh 8

214. Microwave Measurements Laboratory I.—Experimental work to accompany Physics 213. Concurrent registration in Physics 213 is required. (Same as Electrical Engineering 214*p*.)
3 units, autumn quarter (GINZTON) By arrangement

215. Microwave Measurements II.—Continuation of Physics 213. A study of microwave instruments and components, including impedance transformers, impedance bridges, resonant cavities, directional couplers, microwave filters, attenuators; determination of properties of materials at microwave frequencies. Prerequisite: permission of the instructor. (Same as Electrical Engineering 215*p*.)
2 units, winter quarter (GINZTON) TTh 8

216. Microwave Measurements Laboratory II.—A laboratory course to accompany Physics 215. Prerequisites: Physics 213 and 214. Concurrent registration in Physics 215 is required. (Same as Electrical Engineering 216*p*.)
2 units, winter quarter (GINZTON) By arrangement

217. Microwave Seminar.—A seminar course covering in detail the research problems currently of interest in the microwave laboratory. (Same as Electrical Engineering 217*p*.)
1 unit, autumn, winter, and spring quarters (JAYNES) By arrangement

221. Electromagnetic Theory.—General properties of vector fields. The electrostatic and magnetostatic fields. The general electromagnetic equations. The conservation theorems of electromagnetic theory. Motions of particles in electromagnetic fields. Integration of the inhomogeneous wave equations. Prerequisite: Physics 101 or equivalent.
3 units, autumn quarter (PANOFSKY) MWF 11

225. Classical Theory of Radiation.—The Wiechert potentials. The general field of an accelerated charge. Dispersion and scattering of electromagnetic radiation. Covariant formulation of the laws of electrodynamics *in vacuo* and material media. Introduction to field theory in canonical variables. Prerequisites: Physics 221 and 227.
3 units, spring quarter (PANOFSKY) MWF 11

227. Special Relativity.—The relativity of uniform motion and its formulation through the Lorentz transformation. Kinematics, mechanics, and electrodynamics, with an introduction to tensor-calculus. Prerequisite: Physics 115, Mathematics 132, and preferably Physics 221.
3 units, winter quarter (YENNIE) MWF 11

229. General Relativity.—The relativity of non-uniform motion. Non-Euclidean tensor analysis. Applications to problems of gravitation and cosmology. Prerequisite: Physics 225 or 227.

3 units, spring quarter (———) TThS 11

[In alternate years; not given in 1954–55]

231. Quantum Mechanics I.—The physical basis of quantum mechanics, the Schrödinger wave equation, energy levels, collision theory, the Heisenberg matrix mechanics and transformation theory, approximation methods, identical particles, spin, radiation theory, applications to atomic, molecular, and nuclear systems. Prerequisites: Physics 115, 183, Mathematics 132, and preferably Physics 225 and Mathematics 206.

3 units, autumn quarter (YENNIE) MWF 10

233. Quantum Mechanics II.—Continuation of Course 231. Prerequisite: Physics 231.

3 units, winter quarter (YENNIE) MWF 10

235. Quantum Mechanics III.—Continuation of Physics 233. Prerequisite: Physics 233.

3 units, spring quarter (YENNIE) MWF 10

237. Advanced Quantum Mechanics.—Dirac's relativistic electron theory; introduction to quantized field theory and quantum electrodynamics. Prerequisites: Physics 227, and registration in or completion of Physics 235.

3 units, autumn quarter (LAMB) MWF 9

239. Quantum Theory of Radiation.—Continuation of Physics 237. Further development of quantum electrodynamics, and applications to high-energy processes. Prerequisites: Physics 235 and 237.

3 units, winter quarter (LAMB) MWF 9

241. Nuclear Theory I.—Theory of the properties of atomic nuclei by application of quantum mechanics to the proton-neutron model. Collision of nuclear fragments, radioactive decay, nuclear energy levels and reactions. Prerequisites: Physics 233, and preferably Physics 227.

3 units, autumn quarter (BLOCH) MWF 10

243. Nuclear Theory II.—Continuation of Course 241. Prerequisites: Physics 235, 241.

3 units, winter quarter (BLOCH) MWF 10

246. Nuclear Moments.—The electric and magnetic moments of atomic nuclei and their relation to nuclear constitution. Investigation of the moments by measurements on hyperfine structure, molecular beams, and nuclear induction. Prerequisite: Physics 235.

3 units, spring quarter (BLOCH) MWF 9

247. Solid State Theory.—Crystallographic groups and crystal classes. Electronic structure of solids, classification into metals, ionic crystals, etc. Free electron theory of metals and band approximation. Semi-conductors, ferromagnetism and ferroelectricity. Prerequisite: Physics 235.

3 units, autumn quarter (———) TThS 9

[In alternate years; not given in 1954–55]

249. Seminar or Special Topics in Physics.

Summer quarter (———) [Offered occasionally]

250. Research.—Under this head may be included all work in experimental or theoretical problems in research, as distinguished from the independent study of nonresearch character listed as Courses 199 and 201. Written report of the work of the student is required at the end of the quarter. Open only to graduate physics major students, with permission of instructor.

Any quarter (ANY MEMBER OF THE DEPARTMENT) By arrangement

POLITICAL SCIENCE

GRAHAM H. STUART, Professor Emeritus

PHILIP W. BUCK, THOMAS S. BARCLAY, ARNAUD B. LEAVELLE, ROBERT A. WALKER, JAMES T. WATKINS IV (Executive Head), Professors
ALFRED J. DE GRAZIA, Associate Professor
CORNELIUS P. COTTER, ROBERT A. HORN, HUBERT R. MARSHALL, MARTIN B. TRAVIS, Assistant Professors

PURPOSE

The purpose of instruction in the Department of Political Science is (1) to offer all students courses designed to introduce them to the political aspects of society, to train them in the analysis of political problems and to equip them for the exercise of their duties as citizens, (2) to provide undergraduate majors with a program of study leading to the A.B. degree in political science as a foundation for a liberal education, and (3) to give candidates for graduate degrees training preparatory to careers in government, research, teaching, or private enterprise where a knowledge of domestic politics and foreign affairs is in demand.

ENROLLMENT

Upper Division students with an average grade of C or better may be enrolled as undergraduate majors in political science with the approval of the department.

Lower Division students planning a political science major should include in their Lower Division programs the required introductory courses Political Science 1 and 2, American Government; and 20, Comparative Government.

Students of high scholastic standing who wish to study for special honors in political science in a program providing individual direction, independent study and a senior thesis should consult the Department head.

GRADUATION

The minimum requirements for recommendation for the degree of Bachelor of Arts with political science as the major subject are:

1. Registration at Stanford for one quarter, a C average or better in all requirements for the major, and 15 units of work offered by this department.
2. The completion of 50 units of political science, including:
   - *a*) Political Science 1, 2, 20, and 150, or their equivalent.
   - *b*) Advanced courses in at least three of the following fields: administration, comparative government, international relations, political theory, politics, and public law.

With the approval of the student's adviser, a maximum of 10 units selected from the following may be counted toward the political science requirement: Economics 1, 2, Elementary Economics; History 130, Diplomatic History of the U.S.; Philosophy 1, Logic, or Philosophy 2, Ethics; Psychology 60, Statistical Methods, or Statistics 50, Statistics; Psychology 112, Social Psychology, or Sociology 110, Social Psychology.

3. The completion of 15 units of appropriate Upper Division courses in economics, history, law, philosophy, and sociology, selected with the approval of the student's adviser.

Students desiring to prepare for foreign service, municipal management, internships, or other public service are invited to confer with the appropriate members of the department respecting the opportunities in these lines and the course of study most suitable as preparation.

Attention of students interested in the Latin American field is called to the additional opportunity for training in research and publication offered in connection with the *Hispanic American Report* by Humanities 248, Hispanic World Affairs Seminar.

REQUIREMENTS FOR DEGREE OF MASTER OF ARTS

A candidate for the Master's degree shall have a creditable record (with average grade of B or better) of undergraduate work in political science and other social science subjects. During the first week of his second quarter in residence he must apply to the department for admission to candidacy for the degree.

The faculty of the department recommends a candidate for this degree upon the satisfactory completion of at least one full academic year as a graduate student in this department, with 45 units of work in political science, including at least 15 units in seminars, and the presentation of an approved thesis, for which he may receive 5 units. By special permission, work done in related departments may be accepted in lieu of a portion of the work in political science. It is expected that a graduate student will maintain at least an average grade of B in all his work.

At the earliest opportunity a graduate student should register for Political Science 400, Method and Scope of Political Science.

(See *Information Bulletin* for general University regulations.)

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

A candidate for the doctorate shall have a creditable record of previous work in political science and the other social science subjects. Waiving the Master of Arts requirement may be recommended by the professor in charge of the student's special field. Early in his second quarter in residence the faculty of the department will have an oral interview with the candidate.

Formal admission to candidacy is further dependent upon successful examination in a reading knowledge of two modern languages in addition to English, which normally will be French and German. For students with public law, politics, or administration as the area of research, one language, French or German, and a special-skill field in another discipline may be approved in exceptional cases. Language study should begin no later than the second quarter of graduate study.

Major Requirements.—The work in the major department, apart from the dissertation, represents approximately two-thirds of the program for the doctorate. It should consist of the preparation of four fields, chosen from the following: administration; comparative government; international relations; political theory; politics (parties and elections); and public law. In addition, candidates are required to have had some work, at least the basic course, in each of the remaining political science fields.

The department recommends the candidate for the University oral examination after satisfactory completion of a written examination in each of his four fields and a department oral examination.

Requirements for the Minor.—The remaining third of the candidate's work is to be taken as a minor in another department. In exceptional cases, the minor may consist of a special program. Approval of this department is required in the choice of a minor.

Candidates are urged and expected to supplement their major and minor programs with appropriate work in other disciplines.

Recommendation for the Degree.—The degree will be granted upon recommendation by the department and the University Committee on Graduate Study after satisfactory completion of the University oral examination and a dissertation.

(See *Information Bulletin* for general University regulations.)

MINOR AND TEACHER'S CREDENTIAL

Minor in Political Science.—Candidates in other departments offering a minor in political science must present themselves for an interview with the faculty of this department. Each candidate must prepare two fields in political science in each of which he must take at least 10 units and at least one graduate seminar. Not later than one month before recommendation for the general oral examination, the candidate must pass a satisfactory written examination in the selected fields.

Teacher's Recommendation.—For the recommendation for Junior College Teacher's Credential with political science as a major, the applicant should have completed, in a manner satisfactory to the department, at least 40 units in political science, including Courses 1, 2, and 20. For a minor, the applicant should have completed 24 units, including Courses 1 and 2.

ASSISTANTSHIPS, SCHOLARSHIPS, AND PRIZES

The department has several teaching assistantships in Political Science 1 and 2 and student assistantships in connection with its other courses, which carry stipends beginning at $125 a quarter. These customarily are granted to applicants only after they have been at Stanford for at least one quarter.

A limited number of scholarships and fellowships, including several reserved for political science students, are also available. The attention of undergraduate students is called to the annual Lindsay Peters, Jr., Memorial Prize of $50 for the year's outstanding student in Political Science 1 and 2.

I. COURSES PRIMARILY FOR LOWER DIVISION STUDENTS

1, 2. American Government.—A study of the processes and problems of the various branches of American government, and of the legal framework and functional aspects of American political institutions. Prerequisite: second-year standing.

1.	5 units, autumn quarter	(COTTER)	MTWThF 10
1.	5 units, autumn quarter	(BARCLAY)	MTWThF 2
1.	5 units, winter quarter	(LEAVELLE)	MTWThF 10
2.	5 units, winter quarter	(WALKER)	MTWThF 11
2.	5 units, winter quarter	(———)	MTWThF 2
2.	5 units, spring quarter	(MARSHALL)	MTWThF 1

20. Contemporary Governments Abroad.—An introductory course providing a general survey of the governments of England, France, Russia, Italy, Germany, Japan, and China. The present-day political situation in these states is described and analyzed. Prerequisite: second-year standing.

5 units, autumn and *spring quarters (BUCK) MTWThF 8

45. International Relations.—An introductory survey of the national state system, its characteristic forms, and the principal forces making for conflict and adjustment. Nationalism, imperialism, economic relations, war, diplomacy, and international organization are given special attention.
5 units, spring quarter (WATKINS) [Not given in 1954–55]

II. COURSES PRIMARILY FOR UPPER DIVISION STUDENTS

[Open to graduates and Upper Division students who have taken the necessary prerequisites.]

ADMINISTRATION

100. Public Administration.—Relation of policy to administration, planning, principles of organization, problems of supervision and personal motivation, public relations, decision-making, the budget, administrative responsibility. Prerequisites: Political Science 1 and 2.
5 units, autumn quarter (WALKER) MTWThF 11

101. Administrative Management.—Principles of administrative management, techniques of organization and methods analysis, work measurement, performance budgeting, fiscal control, and central services. Prerequisite: Political Science 100.
5 units [Not given in 1954–55]

103. State and Local Government.—The role of the states in the Federal system; state constitutions; state government; the political process. Federal-state, interstate and state-local relations. Municipal government; politics, popular control, and administrative organization. Prerequisites: Political Science 1 and 2.
5 units, winter quarter (MARSHALL) MTWThF 8

104. Local Government Laboratory.—A field course in municipal affairs offered in co-operation with the Coro Foundation (San Francisco).
2 units, spring quarter (———) T 2–4:30

105. Personnel Administration.—Personnel administration in large-scale organizations; recruitment, position-classification, training, promotion, human relations and morale, labor unions in the public service, political activity of public servants, loyalty. Organization for personnel administration. Prerequisite: Political Science 100.
5 units, autumn quarter (MARSHALL) MTWThF 9

107. Government Control of Business.—Government intervention in the national economy; public policy relative to business and agriculture; administrative techniques (including emergency powers) for securing public policy goals through governmental intervention. Prerequisites: Political Science 1 and 2, or Economics 1 and 2, or permission of instructor.
5 units, autumn quarter (COTTER) MTWThF 1

108. Administrative Regulation.—The process through which administrative agencies formulate and enforce rules and orders governing private conduct; administrative adjudication of disputes arising under such regulatory programs. Prerequisite: Political Science 100, or permission of instructor.
5 units, winter quarter (COTTER) MTWThF 9

109. Government and Labor Relations.—Governmental programs regulating labor-management relations, and attempting to insure economic security for the worker; administrative organization, procedures and problems in applying government labor policy. Prerequisites: Political Science 1 and 2, or Economics 1 and 2, or permission of instructor.
5 units, spring quarter (COTTER) MTWThF 9

110. Administrative Behavior.—The environment of administrative action; political, social, and psychological factors in management; the problem of incentives. Prerequisite: Political Science 100.
5 units, winter quarter (WALKER) TTh 1–3

113. Introductory Seminar in Government and Natural Resources.—Public policy for the multiple purpose development of river basins, the public domain, soils, forests, minerals, and wildlife; problems of resources conservation; pressure groups, legislative bodies and administrative agencies in the planning process; administrative organization. Prerequisite: Political Science 100. Economics 1 and 2 are desirable.
5 units, spring quarter (MARSHALL) T 3–5

114. Introductory Seminar in the Administration of Wartime Controls.—The American and British experience, particularly during World War II, in attempting to plan and enforce the mobilization of the energies and materials necessary to wage total war. Prerequisites: Political Science 1 and 2, or Economics 1 and 2, or permission of instructor.
5 units, winter quarter (COTTER) T 3–5

115. Introductory Seminar in Administration.—Analysis of major contributions to administrative theory, with emphasis on organization and planning; methods and sources in modern administrative research. Prerequisite: Political Science 100.
5 units, autumn quarter (WALKER) M 3

117. Directed Reading in Administrative Regulation.—A survey of the literature (including official reports and court opinions) relating to the process of administrative regulation. (See description of P.S. 108.)
5 units (COTTER) [Not given in 1954–55]

118. Directed Reading in Government Control of Business.—Group reading of literature describing the historical conditions out of which public regulatory programs arose in Great Britain and the U.S., and the values or dangers of public regulation; individual readings in specific policy areas. Prerequisite: permission of instructor.
5 units, spring quarter (COTTER) T 3–5

119. Directed Reading in Administration.—Advanced individual study in public administration. Prerequisite: Political Science 100.
5 units, autumn quarter (MARSHALL) T 3–5

[For graduate courses in Administration, see Part III.]

COMPARATIVE GOVERNMENT

120. Problems of Modern Government.—Government organization, constitutional framework, administrative action and procedures, political parties and public opinion, with emphasis on the United States, Great Britain, France, Germany, and Russia. Topics deal with each problem in several countries.
5 units, winter quarter (BUCK) By arrangement

122. The British Empire.—Imperial organization and Dominion status; the governments of Canada, Australia, and South Africa. Prerequisites: Political Science 1, 2, and 20.
3 units, winter quarter (BUCK) MWF 8

124. Government and Politics in Japan.—The special problems of government under the Meiji and MacArthur constitutions. Desirable prerequisite: Political Science 20.
5 units, winter quarter (WATKINS) [Not given in 1954–55]

125. Government and Politics in China.—The special problems of government since the Republic. Desirable prerequisite: Political Science 20.
5 units [Not given in 1954–55]

126. Government of the Soviet Union.—The Soviet State as a product of Marxist theory and Russian history. The nature and function of the Communist Party, the Five-Year Plans, and the 1936 Constitution. Prerequisite: Upper Division standing.
5 units, spring quarter (BUCK) MTWThF 10

127. Introductory Seminar in Comparative Government.
5 units (BUCK, TRAVIS)

128. Government and Politics in Latin America.—Desirable prerequisite: Political Science 20.
5 units, autumn quarter (TRAVIS) MTWThF 9

129. Directed Reading in Comparative Government. — Prerequisites: Political Science 1, 2, and 20, and preregistration in the preceding quarter.
(BUCK) By arrangement

[For graduate courses in Comparative Government, see Part III.]

INTERNATIONAL LAW AND RELATIONS

130. Introduction to International Law.—Prerequisite: Upper Division standing.
5 units, autumn quarter (TRAVIS) MTWThF 9

131. Administration of United States Foreign Relations.—Organization and functions of the Department of State; duties of diplomatic and consular officers; diplomatic usage.
5 units, winter quarter (WALKER) MW 1

132. Principles and Problems of American Foreign Policy.—The great traditions and their contemporary application: neutrality, freedom of the seas, Monroe Doctrine, Pan-Americanism, pacific settlement, international co-operation, etc.
5 units, winter quarter (WATKINS) MTWThF 11

133. Control of Foreign Policies in Major World Powers.—How foreign policies are made by the major foreign powers, with attention being given to important social, economic and political factors in the actual formulation and conduct of the respective foreign policies.
5 units, spring quarter (TRAVIS) MTWThF 9

138. Latin America and the United States.—A survey of the diplomatic and commercial relations between the United States and the republics of Latin America.
5 units, winter quarter (TRAVIS) [Not given in 1954–55]

139. Directed Reading in International Relations.
(WATKINS, TRAVIS) By arrangement

140. Introductory Seminar in International Relations.
5 units (WATKINS) W 7:30–9:30

147. The United Nations and Its Antecedents.—A descriptive survey of the development of co-operative arrangements within the national state system: the nineteenth-century public unions, the League of Nations, the United Nations, and the specialized agencies: their organization, procedure, and work.
5 units, autumn quarter (WATKINS) MTWThF 11

148. Introductory Seminar in International Organization.
5 units (WATKINS) [Not given in 1954–55]

149. Directed Reading in International Organization.
(WATKINS) By arrangement

[For graduate courses in International Relations, see Part III.]

POLITICAL THEORY

150. Introduction to Political Thought.—Historical survey and evaluation of the principal schools of political thought and suggested political reforms from Plato to the present. Prerequisite: Upper Division standing.
5 units, autumn quarter (Leavelle) MTWTh 10

151. Theory of the State.—Analytical treatment of the elements of the modern state, including: the nature of political power, theories of political obligation, sovereignty, law, rights, revolutions, constitutions. Prerequisite: Upper Division standing.
5 units [Not given in 1954–55]

152. American Political Thought.—A study of the main periods and contributors, from the Puritans to the present. Prerequisite: Upper Division standing.
5 units, spring quarter (LEAVELLE) MTWThF 10

157. Introductory Seminar in Political Theory.
5 units (LEAVELLE)

158. Principles of Political Science.—An integrated and systematic survey of the basic, elementary methods and discoveries of the several fields of political science. Prerequisites: Political Science 1 and 2.
5 units (DE GRAZIA) [Not given in 1954–55]

159. Directed Reading in Political Theory.—Prerequisites: Political Science 150 and preregistration in the preceding quarter, as announced in the *Time Schedule.*
5 units, spring quarter (LEAVELLE) TTh 3

[For graduate courses in Political Theory, see Part III.]

POLITICS

160. Political Parties.—A critical analysis of the political party as a part of the process of government; party organization and activities; nominating and campaign methods; theories and functions of the party system; party responsibility. Prerequisites: Political Science 1, 2, and Upper Division standing.
5 units, winter quarter (BARCLAY) TWThF 10

162. Basic Factors in American Politics.—An analysis of American political, economic, and social forces in their relation to our political system and to the public interest. Prerequisites: Political Science 1 and 2.
5 units, spring quarter (BARCLAY) MTWThF 10

163. Legislatures and Legislation.—An analysis of the structure, organization, and functioning of American legislative bodies; the legislature as an arbiter between conflicting interests; direct legislation. Prerequisites: Political Science 1 and 2.
5 units, spring quarter (BARCLAY) MTWThF 11

164. Public Opinion and Behavior.—The origins, patterns, organization and control of popular attitudes and behavior in the political community. Prerequisites: Political Science 1 and 2.
5 units, autumn quarter (DE GRAZIA) MTWThF 2

165. Political Leadership.—The origins, development, character and practices of political leaders in America and elsewhere. Prerequisites: Political Science 1 and 2.
5 units, winter quarter (DE GRAZIA) MTWThF 2

167. Introductory Seminar in Politics.
5 units (BARCLAY, DE GRAZIA)

169. Directed Reading in Politics.—Prerequisites: Political Science 1 and 2, senior standing, and preregistration in the preceding quarter. Open only to political science majors.
5 units, winter quarter (BARCLAY) W 3-5

[For graduate courses in Politics, see Part III.]

PUBLIC LAW

171. Governmental Power Under the American Constitution.—The American system as an example of political theories of constitutionalism and limited government in practice, with special attention to the doctrines of separation of powers, judicial review, and federalism; and to the recent challenges to classic American constitutionalism. Prerequisite: Upper Division standing.
5 units, autumn quarter (HORN) MTWThF 1

172. The American Constitution and Economic Justice.—The changing relations among ideas of private property rights, political power, and economic justice in American constitutional law; the laissez faire interpretation of the contract and due process clauses; the state police power, and the national regulation of the economy by the Congress. Prerequisite: Upper Division standing.
5 units, winter quarter (HORN) MTWThF 1

173. Civil Liberties in the American Culture.—The relationship between the guarantees of civil rights and civil liberty in the Constitution and cultural mobility in America; freedom of speech and press in an era of mass communications; freedom of association for religious, political, and economic groups; racial, ethnic, and alien minority rights; the protection of those accused of crime. Prerequisite: Upper Division standing.
5 units, spring quarter (HORN) MTWThF 1

175. Introduction to Jurisprudence.—Introductory survey of theories of law for the non-specialist: the relation of law to logic, ethics, and sociology, and correspondence of crucial problems in legal and political theory. Prerequisites: Upper Division standing and either Political Science 171, 172, or 173, or consent of the instructor.
5 units, spring quarter (HORN) TTh 1-3

177. Introductory Seminar in Public Law.
5 units (HORN)

179. Directed Reading in Public Law.—Prerequisites: Political Science 171, 172, or 173, or consent of instructor.

[For graduate courses in Public Law, see Part III.]

GRADUATE COURSES

[Conducted as seminars or reading and discussion groups. Limited to graduates and seniors in political science and in other departments who have completed 20 units in political science. Students should consult the instructor before enrolling.]

200. Seminar in Administration.
5 units, winter quarter (WALKER) W 3

205. Seminar in Governmental Planning.
5 units, autumn quarter (WALKER) [Not given in 1954-55]

220. Seminar in Comparative Government.
5 units, autumn quarter (BUCK) Afternoons (by arrangement)

230. Seminar in International Relations.
5 units, autumn quarter (WATKINS, TRAVIS) By arrangement

231. Seminar in International Law.
5 units (Travis) By arrangement

232. Seminar in International Relations Theory.
5 units, spring quarter (Watkins) Th 7:30 P.M.

236. Seminar in International Administration.
5 units, autumn quarter (———) By arrangement

247. Seminar in International Organization.
5 units, winter quarter (Watkins) Th 7:30 P.M.

250. Political Theory: the Democratic Tradition.
5 units, autumn quarter (Leavelle) Th 3

251. Political Theory: the Authoritarian Tradition.
5 units, winter quarter (Leavelle) Th 3

252. Seminar in Political Theory.
5 units (Leavelle) Th 3

261. Seminar in Politics.
5 units, autumn quarter (Barclay) M 7:30 P.M.

262. Seminar in Public Opinion and Behavior.
5 units (de Grazia) W 3–5

263. Seminar in Political Leadership.
5 units (de Grazia) W 3–5

300. Thesis.
Each quarter (Department Faculty) Afternoons (by arrangement)

400. Method and Scope of Political Science.—A required course for students in their first year of graduate work. Selected topics of major importance in modern government. In preparing periodical reports the student will be expected to familiarize himself with the use of source materials, such as American, foreign, and international public documents, and bibliographical aids.
5 units, autumn quarter (Leavelle) W 3

Graduate students are admitted to the following courses in the School of Law: International Law and American Foreign Policy (Law 270); Directed Research in Constitutional Law (Law 285); Municipal Corporations (Law 274); Administrative Law (Law 276).

Graduate students may consult with the department regarding the feasibility of including, as part of their political science program, one or more of the seminars offered by the Hoover Institute and Library.

PSYCHOLOGY

MAUD MERRILL JAMES, EDWARD KELLOGG STRONG, JR., LEWIS MADISON TERMAN, Professors Emeriti

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ROBERT RICHARDSON SEARS, PAUL RANDOLPH FARNSWORTH, ERNEST ROPIEQUET HILGARD, QUINN MCNEMAR, LOIS MEEK STOLZ, CALVIN PERRY STONE, Professors

THOMAS WILLARD HARRELL, Professor of Applied Psychology (Graduate School of Business) and of Psychology

HENRY BONNER MCDANIEL, Professor of Education and Psychology

Douglas Howard Lawrence, Donald Wayne Taylor, Clarence Leland Winder, Associate Professors

Arthur Paul Coladarci, Associate Professor of Education and Psychology

Albert Bandura, Sanford James Dean, Kenneth Bruce Little, Assistant Professors

Edith Mary Dowley, Assistant Professor, and Director, Stanford Village Nursery School

John Davies Black, Director, Counseling and Testing Center, and Assistant Professor

———, Instructor

REQUIREMENTS FOR DEGREES

Degree of Bachelor of Arts.—For the Bachelor's degree, 45 units of psychology are required, including Courses 51, 60, and one laboratory course from among 100, 102, 117, or 133. The following courses in other fields allied to psychology may be counted as fulfilling up to 10 of the nonlaboratory units for the degree:

Anthropology 2.	Cultural Anthropology	5 units
Biology 25.	Genetics	4 units
Education 115.	Psychological Foundations of Education	5 units
Mathematics 123.	Theory of Probability	3 units
Philosophy 1.	Logic	5 units
Physiology 101.	Introduction to Human Physiology	5 units
Sociology 2.	Introduction to Social Psychology	5 units
Sociology 114.	Public Opinion	5 units
Sociology 125.	Criminology	5 units

A student must have an average grade of C or better for his work in psychology in order to receive the departmental recommendation for graduation.

Admission to Graduate Standing.—A candidate for admission to graduate work must file a report of his scores on the Graduate Record Examination as part of his application. This examination may be taken at most American colleges (see your Registrar for further information). Application must be completed by June 1. Admission to both clinical and non-clinical training programs is strictly limited. After a candidate is admitted, he may have until June 15 to notify the Department of Psychology of his formal acceptance. Unless such notification is received by June 15, the admission will be revoked, and that opening will be offered to the next alternate on the list.

Degree of Master of Arts.—For the degree of Master of Arts, 27 units in psychology beyond the equivalent of an undergraduate major are required. These units must include the following courses: 150*a*, 150*b*, 207, 209, 210, and 213. Psychology 208 may be substituted for 209. In addition to the above six courses, the 27 units must include three units of research work under 275 each quarter during the student's first year. The total graduate units should be 45.

No formal written examinations are required for the Master of Arts degree, but in lieu thereof a student's eligibility is evaluated in terms of his performance in the above required courses.

A thesis is required. This must be satisfactory to a departmental committee of two members and to the Committee on Graduate Study.

Very few students, and only those whose Upper Division record is outstanding, are accepted as candidates for a terminal A.M., since the major emphasis in the graduate program is on preparation for the doctorate. One or two per year are accepted for work in child psychology and nursery education. Candidates for an A.M. in clinical psychology are not accepted. If a student enters graduate study with an inadequate undergraduate background in psychology, the time required for obtaining the degree of Master of Arts will be more than three quarters.

Degree of Doctor of Philosophy.—In addition to fulfilling the residence requirement for the degree, the following requirements are stipulated:

1. The student must satisfactorily fulfill all the course and research requirements listed above for the Master's degree. If the candidate already has a Master's degree in psychology from another institution, he must demonstrate competency in the areas covered by the required courses listed above or else take these courses upon admission. Additional courses are planned in consultation with faculty advisers. These are not specified in terms of hours except in the case of special curricula, such as the curriculum in clinical psychology.
2. A nine-hour written examination in one of the major areas in psychology listed below:
   - Clinical
   - Child and Adolescence
   - Social and Personality
   - Physiological and Comparative
   - Perception and Learning
   - Psychometrics
3. Completion of a university minor, or its equivalent, satisfactory to the Committee on Graduate Study. Candidates for the Ph.D. degree may have the minor waived by selecting 12 units outside the department and by taking a six-hour written examination in a secondary area in psychology. A secondary area in psychology is defined primarily in terms of the areas listed above except that a secondary area does not involve as extensive a mastery. Additional secondary areas can be defined for the individual student upon approval of the faculty.
4. Demonstrated reading knowledge of two foreign languages, preferably French and German. Upon petition to the departmental faculty another modern language may be substituted for one of these, or upon petition to the Committee on Graduate Study a special program of courses may be substituted for one language. Not more than one Romanic language may be offered.
5. Completion of the University oral examination on the major and minor.
6. A dissertation satisfactory to a departmental committee of three members and to the Committee on Graduate Study.

Any Ph.D. dissertation submitted more than five years after the oral examination will be accepted for consideration only after departmental reexamination of the candidate.

Minor for the Degree of Doctor of Philosophy.—Candidates for the degree of Doctor of Philosophy in other departments who elect a minor in psychology will be expected to complete the equivalent of 45 units in psychology, of which at least 15 must be taken as a graduate student. The courses completed must include 150*a* and 150*b*. Advanced Statistical Methods. A six-hour written examination is required for the minor, covering an area to be defined for the student upon the approval of his minor adviser.

PROGRAM IN CLINICAL PSYCHOLOGY

Graduate Training Program Leading to the Ph.D. in Clinical Psychology.— Admission to the graduate training program leading to the Ph.D. with a specialization in clinical psychology is subject to the approval of a departmental committee; maintenance of status in that program is contingent upon satisfactory achievement in the required courses. Ordinarily, selection for this training will be made at the end of the spring quarter of each academic year from those candidates who have already completed three or more quarters of graduate work at Stanford.

The program presupposes an adequate background in statistics and in child, abnormal, social, and laboratory psychology. Eighteen units of the required courses may be taken by qualified Upper Division students.

The courses listed below serve as the foundation for the required departmental work for the Ph.D. in clinical psychology. The first two years of the four-year program provide both general background knowledge and training in techniques basic to clinical practice. Normally, the student enrolls for a full academic load of 15 units per quarter for six quarters, or two academic years. During this period he takes 73 units of the required courses listed below and 17 units of electives, some of which may apply to the completion of the minor requirements for the Ph.D. The 9 units of Psychology 257, Clinical Practicum, are to be taken in three different types of clinical facilities, one of which must be medical or psychiatric.

Ordinarily, the third year is devoted largely to internship training consisting of supervised training and service in clinical facilities. Close liaison with the department is maintained to provide advanced individual instruction and to facilitate rotation through at least three types of clinics, thereby insuring the necessary variety in clinical experience. The fourth year is ordinarily devoted primarily to the thesis, though internship training may be continued on a reduced scale during this year if the student has not yet completed the required equivalent of a full year of actual internship service. Also, the fourth year provides an added opportunity to attend such supplementary courses and seminars in psychology and related disciplines as are pertinent to training. The student may register for the 45 units required in the last two years at any time during that period. This provides for considerable latitude in the formulation of internship and research plans.

All students working for the Ph.D. in clinical psychology will adhere to this program as closely as possible. Deviations from it must be approved by the departmental committee which may make adjustments for equivalent course work and practical experience in individual cases.

BASIC CURRICULUM IN CLINICAL PSYCHOLOGY

FIRST YEAR

		Units
Psychology 150*a*, *b*.	Advanced Statistical Methods	6
Psychology 207.	History and Modern Viewpoints	3
Either Psych. 208 *or*	Physiological and Comparative	3
Psych. 209.	Perception and Thinking	3
Psychology 210.	Learning and Motivation	3
Psychology 213.	Personality	3
Psychology 251.	Psychological Evaluation I	5
Psychology 252.	Psychological Evaluation II	5
Psychology 253.	Psychological Evaluation III	5
Psychology 275.	Research	9
	Required units	42
	Elective units	3
	Total	45

SECOND YEAR

		Units
Physiology 205 *or*	Physiology for Psychologists	3
Physiology 305.	Physiology of Central Nervous System	3
Psychology 254.	Psychodiagnosis	5
Psychology 255.	Theories of Psychotherapy	3
Psychology 256.	The Interview	5
Psychology 257 *or*	Practicum	9
Psychology 258.	Practicum	9
Psychology 265.	Seminar in Clinical Psychology	6
	Required units	31
	Elective units	14
	Total	45

THIRD AND FOURTH YEARS

Psychology 259.	Internship in Psychology	15
Psychology 280.	Doctoral Research	15
	Required units	30
	Elective units	15
	Total	45
	Required units in the basic curriculum	103
	Elective units in the basic curriculum	32
	Total	135

GENERAL INFORMATION

Teacher's Credentials.—Psychology may be offered as either a teaching-major or a teaching-minor for the Junior College Credential. For details consult pages 32–33 and the credential secretary of the School of Education.

Fellowships and Assistantships.—The Dr. C. Annette Buckel Foundation, supplemented by additional support from the Board of Trustees of the University, has provided a research assistantship for the psychology and pedagogy of backward children. The Thomas Welton Stanford Fellowship in Psychic Research is a post-doctoral fellowship for research in psychic phenomena, established by the Trustees, in 1913, from the "Psychic Fund" created by Mr. Thomas Welton Stanford. A research assistantship is maintained in connection with the Division of Neuropsychiatry, Stanford School of Medicine. There are teaching assistantships in general and experimental psychology, child psychology, and statistics. Usually several other research assistantships are available in connection with special investigations. Readers are employed to assist in course examinations.

Laboratories. — Aside from lecture and seminar rooms and offices, the department has well-equipped laboratories comprising some thirty rooms which are adapted to research and laboratory course work. Special facilities are available, in addition to the general laboratory, for experimentation with animals.

Nursery School.—The department maintains the Stanford Village Nursery School in order to provide a laboratory for child observation, for training in nursery school practice, and for research. A special program has been arranged for students who wish to specialize in child development for the Master of Arts or Ph.D. degree.

Summer Quarter.—The courses announced for the summer quarter are those regularly scheduled in the department curriculum. Additional courses may be announced in the *Summer Quarter Bulletin,* to be issued in February 1955.

COURSES OPEN TO LOWER AND UPPER DIVISION STUDENTS

51. General Psychology.—Prerequisite: sophomore standing. Freshmen who have maintained a B average during two quarters of residence may apply for admission.

5 units, autumn quarter (Taylor) MWThF 3 (T sections)
5 units, *winter quarter (Farnsworth) MWThF 11 (T sections)
5 units, *spring quarter (Hilgard) MWThF 2 (T sections)
5 units, *summer quarter (———) MTWThF 9 (and 1-hour section)

60. Statistical Methods.—Prerequisite: Mathematics A, or equivalent.

5 units, autumn quarter (Lawrence) MTWThF 9
5 units, *winter quarter (McNemar) MTWThF 8
5 units, *spring quarter (McNemar) MTWThF 8
4 units, *summer quarter (Little) MTWThF 8

COURSES PRIMARILY FOR UPPER DIVISION STUDENTS

100. Individual Differences Laboratory.—Prerequisites: Psychology 51 and 60.

3 units, autumn quarter (Little) Lec. TTh 1; Lab. (I) T 2–4 or (II) W 2–4, or (III) Th 2–4, or (IV) F 2–4

101. Learning and Perception.—Prerequisites: Psychology 51 and 60.

5 units, winter quarter (Lawrence) MTWThF 1

102. Learning and Perception Laboratory.—Prerequisite: Psychology 101.

3 units, spring quarter (Lawrence) TTh 1–4

104. Special Laboratory Projects.—Prerequisites: Psychology 100 *or* 102, and permission of the instructor.

3 units, each quarter (Staff) By arrangement

110. Motivation and Personality.—Prerequisite: Psychology 51, or equivalent.

3 units, winter quarter (Sears) MWF 2

111. Child Psychology.—Prerequisite: Psychology 51, or equivalent.

4 units, autumn quarter (Stolz) MWF 1
4 units, *spring quarter (Dowley) MWF 2

112. Social Psychology.—Formation of social stereotypes and the effect of the social environment on the individual. Prerequisite: Psychology 51. Suggested preliminary work: Sociology 2.

3 units, spring quarter (Farnsworth) MWF 1

113. Industrial Psychology.—Prerequisite: Psychology 51, or equivalent.

3 units, spring quarter (Taylor) MWF 9

114. Psychology of Music.—Survey of the psychological principles underlying the arts. Consideration of music tests. Prerequisites: Psychology 51, and some knowledge of music.

3 units, spring quarter (Farnsworth) MWF 10

116. Adolescent Development.—Prerequisite: Psychology 111, or equivalent. (Listed also as Education 116.)

4 units, winter quarter (Stolz) MWF 10

117. Observation of Children.—Prerequisites: Psychology 111, or equivalent, and permission of instructor. Enrollment limited to 16.

3 to 5 units, autumn and *winter quarters (Dowley) W 1–3 (and by arrangement)
3 to 5 units, *spring quarter (———)

127. Introduction to Physiological Psychology.—Prerequisites: Psychology 51, and one or more college courses in animal biology (zoology) or physiology.

3 units, winter quarter (Stone) MWF 11

130. Introduction to Comparative Psychology.—Historical and methodological survey of the subject; consideration of experiments on learning, retention, imitation, ideation, and innate behavior. Prerequisite: Psychology 51.

4 units, autumn quarter (Stone) MTThF 8

262. Seminar in Psychological Theory. — Prerequisite: consent of instructor.
2 units, spring quarter (LAWRENCE) W 7:30–9:30 P.M.

263. Seminar in Comparative Psychology: Chimpanzees.—Prerequisite: consent of instructor.
2 units, winter quarter (STONE) TTh 9

264. Seminar in Child Psychology.—Prerequisite: consent of instructor.
2 units [Not given in 1954–55]

265. Seminar in Clinical Psychology.—Prerequisite: consent of instructor.
2 units, autumn quarter (LITTLE) F 3–5
2 units, winter quarter (WINDER) M 3–5
2 units, spring quarter (DEAN) M 3–5

269. Seminar in Group Dynamics.—Prerequisite: consent of instructor.
2 units [Not given in 1954–55]

275. Research.—Research of an intermediate nature, whether or not to be used toward the Master's thesis, may be undertaken with individual members of the department faculty.
(DEPARTMENT FACULTY) By arrangement

280. Doctoral Research. — Research undertaken in connection with the doctoral dissertation.
(DEPARTMENT FACULTY) By arrangement

[**Seminar in Educational Psychology.**—See Education 415.]

[**Physiology of the Central Nervous System.**—See Physiology 305.]

[**Physiology for Psychologists.**—See Physiology 205.]

[**Seminar: Problems in Educational and Vocational Guidance.**—See Education 430.]

[**Counseling Techniques Practicum.**—See Education 333*b*.]

[**Individual Study in Educational and Vocational Guidance.**—See Education 430*i*.]

[**Guidance.**—See Education 330.]

[**Psychological Assessment of the Individual.**—See Education 316.]

[**Mental Hygiene.**—See Education 317.]

[**Counseling Techniques.**—See Education 333*a*.]

SOCIAL SCIENCES (SPECIAL PROGRAMS)

GENERAL PROGRAM

———, Chairman

The General Program, leading to the degree of Bachelor of Arts (Social Sciences—General), is designed for students wishing to pursue a broad educational program emphasizing the social sciences without concentrating upon a particular branch of the social sciences to the extent required of departmental undergraduate majors. Candidates are urged at an early stage to plan their programs with the faculty advisers to whom they will be assigned upon designation of their choices of fields of concentration (see below).

REQUIREMENTS FOR ENROLLMENT

Requirements for enrollment in the General Program as a major student are: (1) Upper Division standing; (2) an average grade of C in all social science courses taken at Stanford University, if transferring from a school or department in this University.

GRADUATION

Required Courses.—The following basic courses, totaling 40 to 42 units, must be completed by students majoring in the program:

Econ. 1 and 2. Elementary Economics	10 units
Hist. 10, 11, and 12. History of Western Civilization	12 units
Pol. Sci. 1 and 2. American Government	10 units

In addition to the foregoing, 10 units are to be completed from the courses listed below:

Psych. 51. General Psychology	5 units
Soc. 1. Introduction to Sociology	5 units
Anth. 2. Cultural Anthropology	5 units

[NOTE.—Two of the 5-unit survey courses in American and European History, History 103, 104, 121, and 122, may be substituted for History 10, 11, and 12.]

Fields of Concentration.—In addition to the basic required courses, students majoring in the program must complete 50 units of Upper Division courses in three of the following fields of concentration, with 20 units falling in one field and 15 units in each of two others.

The fields of concentration are: (*a*) Economics (which may include Food Research); (*b*) History; (*c*) Political Science; (*d*) Psychology; (*e*) Sociology; and (*f*) Cultural Anthropology.

A course in statistical methods is strongly advised; and one of the Lower Division courses, Psychology 60, Statistical Methods (5 units), or Statistics 50, Statistics (5 units), if taken, will be counted as an Upper Division course within any of the three fields, Economics, Psychology, or Sociology, or as an additional social science course outside of the concentrations, as the student elects.

The special courses, Social Sciences 101, 102, 103 (see p. 274), and 120, and Lower Division courses in Accounting offered by the Department of Economics, may not be counted toward the major requirements in the General Program.

General Requirements.—Candidates are recommended for the degree of Bachelor of Arts on completion of the 90 (or 92) units of work specified above. An average grade of C is required in all social science courses taken at Stanford University and counting toward the major. Additionally, students must achieve an average grade of C in work taken at Stanford, within *each* of the three chosen fields of concentration including the Lower Division work in those fields.

INDIVIDUAL PROGRAMS

A student whose aim cannot be realized by the General Program, by other Special Programs in Social Sciences, or by the programs offered by the departments of Economics, History, Political Science, Psychology, and Sociology and Anthropology, may petition for approval of an individual program planned in advance. In no case shall such a program total less than 80 units.

SERVICE COURSE

120. Marriage and the Family.—Primary emphasis is placed upon preparation for marriage. Prerequisites: Upper Division or graduate standing and consent of instructor in charge. (This course may not be counted toward the major requirements in the General Program.)

4 units, winter quarter (———) MTWTh 4

INTERNATIONAL RELATIONS PROGRAM

JAMES T. WATKINS IV, Chairman

The Program in International Relations is designed to serve two purposes: (1)to provide an undergraduate major for students interested in the whole field of international relations; and (2) to provide a vocational preparation for students expecting to enter one of the professional fields of work in international relations. Professional occupations exist in governmental service, in international agencies, in business and commercial activities, in the work of foundations and charitable institutions, and in teaching.

The program may lead successively to the degrees of Bachelor of Arts and Master of Arts. Candidates for the degree of Bachelor of Arts, with vocational interests, are especially urged to consult promptly with the faculty advisers to whom they will be assigned.

Students expecting to pursue graduate study beyond the Master of Arts degree are advised to familiarize themselves at an early date with the requirements of the disciplines of their preference: normally, economics, history, or political science.

REQUIREMENTS FOR ENROLLMENT

To be accepted for enrollment in the International Relations Program, students must have Upper Division standing and an over-all C average. Students electing this program are expected to acquire a reading knowledge of a modern foreign language.

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF ARTS

Students will be recommended for graduation upon completion, with a C average or better, of the required courses and concentrations listed below.

REQUIRED COURSES

The following courses are required for students majoring in the program. Students should note that, prerequisites for admission are established only for Economics 115, 117, and 165.

Econ. 165. Introduction to International Economics
Hist. 104. Europe since 1914
Hist. 130. Diplomatic History of the United States
Geog. 4. Economic Geography
Pol. Sci. 1. American Government
Pol. Sci. 20. Contemporary Governments Abroad
Pol. Sci. 130. Introduction to International Law
Pol. Sci. 147. The United Nations and Its Antecedents

One of the following:

Econ. 115. Economic History of Europe
Hist. 103. Europe in the Nineteenth Century

One of the following:

Econ. 117. Economic History of the United States
Hist. 122. American History since 1890
Hist. 132. The Westward Movement in the United States

CONCENTRATIONS

Candidates for the degree of Bachelor of Arts, in addition to the required courses listed above, must offer a minimum concentration of 10 units in each of two of the five groups described below. Other unlisted courses may be offered on consent of the adviser.

Group I. Economic and Political Geography

- Food Res. 101. The World's Food
- Food Res. 140. International Trade in Agricultural Commodities
- Geog. 111. Geography of Eastern United States and Canada
- Geog. 112. Geography of Western United States and Canada
- Geog. 120. Geography of South America
- Geog. 121. Geography of Middle America
- Geog. 130. Geography of Asia
- Geog. 133. Geography of the Soviet Union
- Geog. 145. Geography of Europe
- Geog. 170. Conservation of Natural Resources
- Geog. 191. Geographical Foundations of National Power (Geopolitics)
- Soc. 130. Population
- Soc. 131. World Migration
- Soc. 134. World Population Problems

Group II. International Economic Relations

- Econ. 120. Comparative Economic Systems
- Econ. 121. Theories of Economic Development
- Econ. 125. Money and Finance
- Econ. 126. International Financial Problems
- Food Res. 140. International Trade in Agricultural Commodities

Group III. International Law, Organization, and Administration

- Anth. 165. Problems of Administration in Pacific Dependencies
- Pol. Sci. 45. International Relations
- Pol. Sci. 100. Public Administration
- Pol. Sci. 131. Administration of United States Foreign Relations
- Pol. Sci. 132. Principles and Problems of American Foreign Policy
- See also, Hoover Institute

Group IV. World Politics

- Hist. 107. The British Empire
- Hist. 112. Russia
- Hist. 115. Diplomatic History of the Far East
- Hist. 118. Latin America since 1810
- Hist. 125. The Near East
- Hist. 148. Germany since 1848
- Hist. 164. United States in World History
- Hist. 183. Soviet Foreign Policy
- Hist. 186. The Balkans and the Near East since 1800
- Hist. 187. Islamic World
- Hist. 194. Modernization of Japan and China
- Hist. 196. United States and the Far East
- Hist. 197. Southeast Asia and the Philippines
- Pol. Sci. 45. International Relations
- Pol. Sci. 122. The British Empire
- Pol. Sci. 124. Government and Politics in Japan
- Pol. Sci. 125. Government and Politics in China
- Pol. Sci. 133. Contemporary World Politics
- Pol. Sci. 150. Introduction to Political Thought
- Rom. Lang. AS143–145. Hispanic World

(With special permission of his adviser, when appropriate, a student may select one of the following: Classics H100, History of Greece to 404 B.C.; Classics H103, The Hellenistic World; Classics H155, Augustus and the Organization of the Roman Empire.)

Group V. Regional Studies

Any one of the following subgroups may be chosen by the student. The student is permitted to petition to elect a subgroup different geographically from the ones illustrated below, e.g., Southeastern Europe, the United States, the Near East, etc.

Subgroup 1. Western Europe

- Geog. 145. Geography of Europe
- Hist. 142. The French Revolution and the Napoleonic Era
- Hist. 148. Germany since 1848
- Rom. Lang. AF153. French Civilization
- Rom. Lang. AF155. Social Problems of the France of Today
- Rom. Lang. AF156. Political Problems of the France of Today

Subgroup 2. The British Empire

- Hist. 105. England
- Hist. 106. Great Britain since 1760
- Hist. 107. The British Empire
- Hist. 158. English Constitutional History
- Hist. 176. History of Canada

Subgroup 3. The Soviet Union

Hist. 112. Russia
Hist. 181. Nineteenth Century Russia
Hist. 182. Russia since 1917
Hist. 183. Soviet Foreign Policy
Geog. 133. Geography of the Soviet Union
Anth. 153. Peoples of the Soviet Union
Asiatic R91. Russian Civilization
Pol. Sci. 126. Government of the Soviet Union
Pol. Sci. 127. Soviet Law and Planning

Subgroup 4. Latin America

Hist. 118. Latin America since 1810
Hist. 173. Historical Evolution of Mexico
Geog. 120. Geography of South America
Geog. 121. Geography of Middle America
Pol. Sci. 138. Latin America and the United States
Rom. Lang. AS143–145. Hispanic World
See also, Hoover Institute

Subgroup 5. Asia

Anth. 152. Peoples of East Asia
Asiatic C161. Contemporary China
Asiatic E91. Indian Civilization
Asiatic P166. Indonesia
Hist. 114. History of Civilizations of Eastern Asia: Modern Period
Hist. 115. Diplomatic History of the Far East
Hist. 125. The Near East
See also, Hoover Institute

REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS

Provisional enrollment for the degree of Master of Arts in the International Relations Program will be made on presentation of a creditable record of undergraduate work (with average grade of B) equivalent to the subject-matter requirements of the degree of Bachelor of Arts stated above. Subject-matter deficiencies in the undergraduate record have to be made up before the degree is granted. Faculty advisers will provide guidance in course work and in choice and direction of thesis, and will approve application for formal admission to candidacy to the Committee on Graduate Study.

Candidates will be recommended for the degree upon satisfactory completion (with average grade of B) of at least one full academic year as a graduate student with 45 units of work, not more than 15 units of which may be fulfilled by the required thesis. The candidate must also demonstrate a satisfactory reading knowledge of one modern foreign language, competence to be established by two quarters of second-year reading courses with average grade of C, certification of adviser, or examination, at discretion of committee in charge; and, if he offers a regional field of study, the language must be appropriate to that field.

Work for the degree must be concentrated in three of the five fields of study (groups) named and illustrated above under "Requirements for the Degree of Bachelor of Arts." One field requirement may be satisfied by presentation of the required thesis on a subject lying within that field; the other two field requirements must be met by work in courses of an advanced character.

SPECIAL PROGRAMS

Attention of both undergraduate seniors and graduate students interested in Latin American Studies is called to the opportunity for training in research and publication provided by the *Hispanic American Report* in connection with the Hispanic World Affairs Seminar (Humanities 248).

Course of Instruction

100. International Relations: Advanced Practice.—Practice work in executive positions of the Institute of International Relations, with weekly conferences. Restricted to fourth-year undergraduate students who qualify by election or appointment as officers of the Institute of International Relations and who are admitted by the consent of the instructor. May be taken for a maximum of three quarters.

1 unit, autumn, *winter, and *spring quarters (WATKINS) By arrangement

PREPROFESSIONAL SOCIAL SERVICE PROGRAM

PAUL WALLIN, Chairman
RENE B. JACKSON, Lecturer

The Preprofessional Social Service Program, leading to the degree of Bachelor of Arts (Social Sciences—Social Service), is designed especially for students intending to prepare themselves for graduate work in the field of social service at other institutions. Advanced training is not available at this University. Candidates are urged at an early stage to consult with the faculty advisers to whom they will be assigned.

Requirements

Requirements for admission to the Preprofessional Social Service Program are the same as those now in effect for the General Program.

Requirements for the degree of Bachelor of Arts in Social Sciences—Social Service are as follows:

Courses required of all students:

Econ. 1 and 2. Elementary Economics	10 units
Pol. Sci. 1 and 2. American Government	10 units
Psych. 51. General Psychology	5 units
Soc. 1. Introduction to Sociology	5 units
Soc. 2. Introduction to Social Psychology	5 units
Soc. Sci. 101, 102, 103. Introduction to Social Service	12 units

It is also considered desirable fot students planning to proceed to professional training in social service to have a background in history equivalent to that given by History of Western Civilization (History, 10, 11, 12). Students who have not had these or comparable courses should attempt to make up this deficiency.

In addition to the foregoing, 35 units are to be completed from the courses listed below. Substitutions may be made for these courses, on consent of the adviser.

Econ. 145. Labor Problems	5 units
Pol. Sci. 100. Public Administration	5 units
Pol. Sci. 102. Municipal Administration	5 units
Psych. 60. Statistical Methods (or Statistics 50, or Economics 80)	5 units
Psych. 111. Child Psychology	4 units
Psych. 112. Social Psychology	3 units
Psych. 152. Measurement of Intelligence	4 units
Psych. 160. Abnormal Psychology	5 units
Psych. 256. The Interview	5 units
Soc. 110. Social Psychology	5 units
Soc. 111. Personality Maladjustments	5 units
Soc. 124. Social Disorganization	5 units
Soc. 125. Crime and the Criminal	5 units
Soc. 127. The Family	5 units
Soc. 142. The City	5 units

A student must achieve an average grade of C or better in all courses included in this curriculum to be recommended for the degree of Bachelor of Arts.

COURSES OF INSTRUCTION

101, 102, 103. Introduction to Social Service.—Primarily for majors in Social Science—Social Service. Orientation in social work through study of the basic literature, and preliminary training in casework techniques through placement as a voluntary worker in a social agency. (These courses may not be counted toward the major requirements in the General Program.)
4 units, autumn, winter, and spring quarters (JACKSON) Afternoons by arrangement

SOCIOLOGY AND ANTHROPOLOGY

CHARLES NATHAN REYNOLDS, Professor Emeritus
HUTTON WEBSTER, Lecturer Emeritus

FELIX MAXWELL KEESING, RICHARD TRACY LAPIERE, PAUL WALLIN, Professors
GREGORY BATESON, Visiting Professor
PAUL FEJOS, Consulting Professor
BERNARD JOSEPH SIEGEL, Associate Professor
BERT ALFRED GEROW, Associate Professor and Curator of Anthropological Collections
EDMUND HOWELL VOLKART, Assistant Professor
GEORGE DEARBORN SPINDLER, Assistant Professor of Education and Anthropology
STEPHEN TAYLOR BOGGS, BURTON ROBERT CLARK, Acting Assistant Professors
FRANCES UNDERWOOD, Lecturer
JOHN HAST WEAKLAND, Research Associate
GENE MCNAUGHTON STIRLING, Museum Associate

The courses offered by the Department of Sociology and Anthropology are designed: (1) to provide undergraduate students who wish to add to their general education or to supplement collaterally their major field with instruction in these two disciplines that deal with man from the broadest viewpoints of biological heritage, culture, society, and personality; (2) to provide undergraduate majors both in sociology and in anthropology with programs of work leading to the Bachelor's degree, and to offer the opportunity for those working in the one field to become familiar with the other as part of their program; and (3) to prepare candidates for advanced degrees both in anthropology and in sociology.

Enrollment in the Department.—Students are eligible for enrollment as majors in sociology or in anthropology when they have Upper Division standing in the University. Upper Division students wishing to change their majors to sociology or anthropology will be accepted if they have an average grade of C or higher in all courses counting toward a major in the field selected. Lower Division students planning to major in sociology or anthropology should, whenever possible, include in their program the introductory courses listed below as requirements for the Bachelor's degree in sociology or in anthropology.

Degree of Bachelor of Arts.—For the Bachelor's degree in sociology or anthropology, 45 units of work are required. The program of courses can be arranged in consultation with the adviser to meet the special needs and interests of the student. The following basic course requirements must, however, be met by majors in either field: Sociology 1; Anthropology 2; and Psychology 51. Majors in sociology must, in addition, take Sociology 2; and majors in anthropology, Anthropology 1.

It is strongly recommended, but not required, that the student take an elementary course in statistics, especially if he anticipates undertaking work for an advanced degree. To be recommended for the Bachelor's degree, the student must have an average grade of C or higher for work in the major field.

Degree of Master of Arts.—To undertake a program of study for the degree of Master of Arts in sociology or in anthropology a student is required to have a Bachelor's degree, or evidence of equivalent training, in the respective field. In addition he must have completed an introductory course in statistics.

To be recommended for the Master's degree a candidate must complete an approved course of graduate study at this University amounting to not less than 45 units of credit, of which at least 30 must be in the major field. It must include one of the following plans: (*a*) With the approval of the department and the acceptance of a member of the staff as director, a candidate may complete a thesis which may be submitted for a maximum of 12 units of the 45 units required; *or* (*b*) The candidate may obtain his training in research by participating in one of the formal research programs within the department for a maximum of 12 units. In the approved course of graduate study no units will count which do not have a grade of C or higher, and the candidate must receive an average grade of B or higher.

Candidates in sociology must include within their programs of study Sociology 255 (Methods of Social Research). Candidates in anthropology must include within their programs of study the following courses: Anthropology 120, 130, 131, 132, 135, and also approved seminar work.

Degree of Doctor of Philosophy.—To be recommended by the Executive Head of the department to the Committee on Graduate Study for admission to candidacy for the degree of Doctor of Philosophy either in sociology or in anthropology, the student must satisfy the following requirements:

(1) He must demonstrate through a brief oral examination, ordinarily early in the second year of graduate study, his ability and preparedness to pursue advanced work; and (2) he must demonstrate to the appropriate examiners, ordinarily before the close of the second year of graduate study, his knowledge of two languages other than English, these languages to be elected in collaboration with representatives of the department; *or*, if the department and the University Committee on Graduate Study approve, he may demonstrate his knowledge of one language other than English and, in addition, complete satisfactorily a program of study of at least 15 units in a field external to his major and minor.

To be recommended for the degree of Doctor of Philosophy in sociology the candidate must (*a*) pass two courses in statistics, or, alternatively, a course in statistics and Sociology 267, (*b*) complete an acceptable doctoral dissertation, and (*c*) demonstrate in departmental written examinations and in the University oral examination his scholarly proficiency in a selection of fields and of areas of specialization within them. The fields and areas of specialization within them (the latter listed in parentheses) are: History and Modern Viewpoints (no specialization); Demography (Human Ecology, Population); Social Organization (The Family, Sociology of Industry); Social Pathology (Criminology, Cultural and Social Bases of Mental Health); Social Psychology (Collective Behavior, Socialization, and Development of Personality).

Every candidate is required to include in his program the field of History and Modern Viewpoints. The remainder of his program will ordinarily consist of:

A. Three fields, one specialization in any field, and a course of study of at least 15 units of advanced work in anthropology or in some other department, the work to be related directly to the elected fields of specialization, *or*

B. Two fields, two specializations in either or both of the remaining fields, and a course of study of 15 units as in program A, *or*

C. Three fields and a minor in anthropology or in some other department, *or*

D. Two fields, a specialization in either of the remaining fields, and a minor in anthropology or some other department.

Candidates may petition for a program differing from the above or for areas of specialization other than those listed. The basic requirement which any program must satisfy is that it familiarize the candidate with the field of History and Modern Viewpoints and at least three of the four other fields.

The degree of Doctor of Philosophy in anthropology is offered at present for candidates intending to specialize professionally in Cultural Anthropology. But a general competence in the other recognized fields of anthropology is also required: Physical Anthropology, Prehistoric Archeology (Prehistory), and Linguistics. To be recommended for this degree the candidate must (*a*) show in departmental written examinations his general competence in the three fields of Physical Anthropology, Prehistoric Archeology and Linguistics, (*b*) complete an acceptable doctoral dissertation, which will include evidence of adequate field work training and experience, (*c*) demonstrate in departmental written examinations and in the University oral examination his scholarly proficiency in Cultural Anthropology as follows: (1) History and Modern Viewpoints in Cultural Anthropology (Ethnology and Ethnography, Social Anthropology); (2) at least three approved areas of specialization, including both topical interests (e.g., Social Organization, Folklore, Personality and Culture Studies, Cultural Dynamics, Cultural and Social Bases of Mental Health) and regional interests (as the Far East, Pacific Islands, Latin America). The approved program will ordinarily consist of:

A. History and Modern Viewpoints, four areas of specialization, and a course of study of at least 15 units of advanced work in sociology or in some other department, the work to be related directly to the elected fields of specialization, *or*

B. History and Modern Viewpoints, three areas of specialization, and a minor in sociology or in some other department.

Comprehensive written examinations in the candidate's selected fields will be arranged by the Executive Head of the department. They must be passed satisfactorily by the candidate before he may be certified for the University oral examination for the degree. These examinations will ordinarily be offered within the first seven weeks of each of the three major quarters.

In the case of students wishing to include Cultural and Social Bases of Mental Health as one of their areas of specialization, it may be possible to arrange for relevant work to be done at a local hospital.

Minor for the Degree of Doctor of Philosophy.—Candidates for the degree of Doctor of Philosophy who wish to offer sociology or anthropology as their minor must have completed at Stanford or elsewhere courses in sociology or in anthropology, respectively, amounting to not less than 35 units of credit before they will be permitted to begin work on their minor. In order to satisfy the department that they are properly qualified to undertake this work, candidates must submit to two brief qualifying oral examinations by designated staff members.

To be recommended for the degree of Doctor of Philosophy with sociology or anthropology as the minor subject, a candidate must acquire scholarly proficiency in two of the recognized fields of the minor. The selection of these fields is subject to the approval of the department. When the candidate has passed a written examination of about three hours' duration in each of the two fields chosen, the department will recommend to the Graduate Study Committee that he be permitted to take the University oral examination. Ordinarily the written and oral examinations will be taken within the same quarter.

A special minor is offered in social anthropology, with a study program concentrated in those anthropological fields of greatest relevance to the behavioral sciences. Choice of fields, to be worked out in consultation with the departmental adviser, might cover such areas of specialization as Personality and Culture Studies, Social Organization, Cultural Dynamics.

Teaching Assistantships, Fellowships, etc.—The department annually nominates a number of graduate students for appointment as teaching assistants. The stipends of appointees are $400 per quarter. The service expected consists for the most part of conducting sections of an elementary course during each of two quarters. Experience shows that able and well-prepared students can carry on this instruction and, at the same time, pursue satisfactorily graduate work on their own account. A number of research assistantships are also available in connection with research programs in the department, with stipends depending on the amount of work involved. Applicants for these appointments for an ensuing quarter should address their requests to the Executive Head of the department. Where students not already working in the department wish to be considered, the application should be accompanied by a complete, authenticated transcript of the academic record (graduate and undergraduate) and should name several persons qualified to speak of the applicant's fitness for the appointment.

The University has a number of fellowships and scholarships available. Particulars are to be found in the annual *Information Bulletin* distributed from the Registrar's Office.

SOCIOLOGY

COURSES PRIMARILY FOR LOWER DIVISION STUDENTS

1. Introduction to Sociology.—An introductory study of the major principles of sociology, with emphasis on group life, its structure and processes. Prerequisite: second-year standing. Freshmen who have maintained a B average during two quarters of residence may apply for admission.

5 units, autumn quarter (BOGGS) MTWThF 11
5 units, *winter quarter (———) MTWThF 3
5 units, *summer quarter (———) MTWThFS 11

2. Introduction to Social Psychology.—A study of the interactions of the individual and his social milieu, with emphasis on the cultural basis of personality. Prerequisite: Sociology 1.

5 units, winter quarter (BOGGS) MTWThF 11
5 units, *spring quarter (———) MTWThF 3

[NOTE.—The course sequence Sociology 1 and 2 is required of all majors in sociology. For others, Sociology 1 may be taken independently of 2.]

COURSES PRIMARILY FOR UPPER DIVISION STUDENTS

Upper Division and graduate courses shown with 5 units may, at the discretion of the instructor, meet either 4 or 5 days a week. Should a course meet for 4 days only, extra work will be required equivalent to the fifth day (usually a Friday) in the form of special reading, a term paper, laboratory work, or otherwise.

100. Social Organization.—The structure and organization of social groups in terms of institutions, stratification, social mobility, and social cohesion. Prerequisite: Sociology 1.
5 units, autumn quarter (CLARK) MTWThF 1

101. Social Change.—The adjustments within society to changes in technology, ideology, and social organization. Prerequisite: Sociology 1.
5 units, winter quarter (LAPIERE) MTWThF 2

110. Social Psychology.—The processes of socialization and the relationship between social organization and personality. Prerequisites: Sociology 2 and Psychology 51, or equivalents. Psychology 112 is suggested preparation for this course.
5 units, autumn quarter (———) [Not given in 1954–55]

111. Personality Maladjustments.—An examination of the relationship between social disorganization and personal maladjustment. Prerequisites: Sociology 1 and Psychology 51, or equivalents.
5 units, autumn quarter (LAPIERE) MTWThF 11

112. Social Control.—A study of the processes and devices by which minority self-interest groups endeavor to determine the behavior of majorities. Prerequisites: Sociology 1 and 2 and Psychology 51, or equivalents.
5 units, spring quarter (LAPIERE) MTWThF 9

113. Mass Behavior.—A study of collective forms of social action such as the audience, crowds, mobs, and the mass movement. Prerequisite: Sociology 2, or equivalent.
5 units, spring quarter (LAPIERE) MTWThF 11

114. Public Opinion.—A study of the nature, determinants, and consequences of public opinion: Prerequisite: Sociology 1.
5 units, autumn quarter (CLARK) MTWThF 3

115. Small Group Behavior.—Introduction to experimental studies of interaction patterns and processes in play groups and committees. Prerequisites: Sociology 2 and Psychology 51, or equivalents.
5 units, spring quarter (BOGGS) MTWThF 3

124. Social Disorganization.—Problems of individual, family and community disorganization are treated in relation to the sociological concepts which they exemplify, and the social processes which bring them about. Prerequisite: Sociology 1.
5 units, winter quarter (WALLIN) MTWThF 10

125. Crime and the Criminal.—A study of the various classes of crime and of the criminal as a deviant social type. Prerequisite: Sociology 1.
5 units, autumn quarter (WALLIN) MTWThF 10

127. The Family.—A study of the form and functions of the family, with particular emphasis on the contemporary American family system. Prerequisite: Sociology 1.
5 units, winter quarter (BOGGS) MTWThF 9

129. Social Psychology of Family Relationships.—Analysis of interpersonal relations of husband and wife, parents and children in contemporary American families. Prerequisite: Sociology 1.
5 units, spring quarter (WALLIN) MTWThF 10

130. Population.—Theories of population growth. Problems arising from relationships between changing quantity and quality aspects of population, resources, techniques, and levels of living. Prerequisites: Sociology 1, or Economics 1 and 2.
5 units, autumn quarter (LAPIERE) MTWThF 9

131. World Migration.—Historical survey of human migration. Causal conditions and social effects. Emphasis upon international movements and migration within the United States. Prerequisites: Sociology 1, or Economics 1 and 2.
5 units, winter quarter (———) [Not given in 1954–55]

134. World Population Problems.—Emphasis upon the United States in the world scene. Confined to contemporary period. Prerequisites: Sociology 1, or Economics 1 and 2.
5 units, winter quarter (———) [Not given in 1954–55]

135. Sociology of Industry.—Industrial organization analyzed as a social institution. The evolution of capitalism from feudalism; and relationships between modern industry and other institutions; the formal and informal organization of the firm. Prerequisite: Sociology 1.
5 units, winter quarter (CLARK) MTWThF 9

137. Bureaucratic Organization.—A study of bureaucratic tendencies in modern organizations. Analysis of the school, the trade union, the political party, the business firm, and the government agency as bureaucratic organizations. Prerequisite: Sociology 1.
5 units, spring quarter (CLARK) MTWThF 2

142. The City.—Human relations, personality, and social structure in urban populations related to the functions of the city in society as a whole. Prerequisite: Sociology 1.
5 units, spring quarter (BOGGS) MTWThF 1

144. American Minorities.—Analysis of the adjustments made where peoples of different race and culture meet. Prerequisite: Sociology 1.
5 units, autumn quarter (BOGGS) MTWThF 9

146. The Community.—Major institutions of the local community; their functions and interrelations. Prerequisite: Sociology 1.
5 units, winter quarter (CLARK) MTWThF 11

147. Social Stratification.—Theories of class and caste systems, and an analysis of empirical studies of the American class system.
5 units, winter quarter (———) MTWThF 10

190. Directed Individual Study.—For undergraduate students with special needs, and showing capacity to do independent work. Prerequisite: consent of instructor.
(DEPARTMENT FACULTY) By arrangement

COURSES PRIMARILY FOR GRADUATE STUDENTS

250. Development of Sociological Theory.—An historical and analytical study of leading sociological thinkers. Prerequisites: senior or graduate standing, and consent of instructor.
5 units, winter quarter (LAPIERE) By arrangement

251. Trends in Contemporary American Sociology.—A critical analysis of the more recent contributions of American sociologists, intended primarily for graduates preparing for a major in sociology. Prerequisites: graduate standing, and consent of instructor.
5 units, winter quarter (LAPIERE) [Not given in 1954–55]

255. Methods of Social Research.—The logic of scientific research and the methods commonly used for the collection of social data. Prerequisites: an introductory statistics course and consent of instructor.
5 units, autumn quarter (WALLIN) By arrangement

256. Sociology and Medicine.—Sociological and psychological problems relating to the incidence, distribution and treatment of mental and physical illness. Prerequisite: consent of instructor.
5 units, spring quarter (WALLIN) By arrangement

265. Seminar in Social Research.—Theory and practice of techniques for the measurement of attitudes, opinions, and other social phenomena. Prerequisite: consent of instructor.
5 units, winter quarter (WALLIN) By arrangement

267. Quantitative Methods in Sociology.—Prerequisite: An introductory course in statistics and consent of instructor.
5 units, spring quarter (CLARK) By arrangement

300. Graduate Research.—Special research projects undertaken for course credit.
(DEPARTMENT FACULTY) By arrangement

301. Graduate Research in History and Modern Viewpoints.
(LAPIERE) By arrangement

302. Graduate Research in Demography.
(———) By arrangement

303. Graduate Research in Social Organization.
(WALLIN, BOGGS) By arrangement

304. Graduate Research in Social Pathology.
(WALLIN, BATESON) By arrangement

305. Graduate Research in Social Psychology.
(LAPIERE, BOGGS) By arrangement

309. Directed Graduate Research.—Research undertaken as alternative to the Master's thesis.
(DEPARTMENT FACULTY) By arrangement

310. Thesis.—Research undertaken in connection with the Master's thesis or the doctoral dissertation.
(DEPARTMENT FACULTY) By arrangement

Graduate students in sociology may, on consent of their department advisers, count for sociology credit certain anthropology courses and seminars relevant to their special interests. Graduate courses offered in other departments and institutes within the University, such as the Psychology Department, the Food Research Institute, and the Hoover Research Institute, may also be elected for graduate credit, provided the course concerned is approved by the adviser as fitting into the student's program.

ANTHROPOLOGY

COURSES PRIMARILY FOR LOWER DIVISION STUDENTS

1. The Development of Man.—Introduction to the fields of physical anthropology and prehistory. Prerequisite: second-year standing. Freshmen who have maintained a B average during two quarters of residence may apply for admission.
5 units, winter quarter (KEESING) MTWThF 10

2. Cultural Anthropology.—Introduction to the fields of ethnology, linguistics, and social anthropology. Prerequisite: second-year standing. Freshmen who have maintained a B average during two quarters of residence may apply for admission.
5 units, autumn quarter (KEESING) MTWThF 1
5 units, *spring quarter (SPINDLER) MTWThF 1
5 units, *summer quarter (———) MTWThFS 9

Anthropology 1 and 2 are required of all majors in anthropology, but either one may be taken first. For others, either may be taken independently.

COURSES PRIMARILY FOR UPPER DIVISION STUDENTS

120. World Ethnography.—World distribution and characteristics of "nonliterate" societies; concepts and methods developed for reconstruction of their culture history. Prerequisite: Anthropology 2, or permission of instructor.
4 units, winter quarter (UNDERWOOD) MTWTh 1

130. Social Anthropology.—Theories and schools in social anthropology, including contemporary functional and "psychological" studies. Prerequisite: Anthropology 2, Sociology 1, Psychology 51, or permission of instructor.
4 units, autumn quarter (KEESING) MTWTh 10

131. Prehistory.—Methods and findings of prehistoric archaeology, with emphasis on Europe and the Near East. Prerequisite: Anthropology 1, or permission of instructor.
4 units, autumn quarter (GEROW) MTWTh 9

132. Physical Anthropology.—Anthropological approaches to the study of man's origins, fossil man, racial differences, and bodily growth. Prerequisite: Anthropology 1, Biology 1, 2, or permission of instructor.
4 units, spring quarter (GEROW) MTWTh 1

135. Language and Culture.—Anthropological approaches to the study of linguistics. Designed to be useful for students in language departments as well as in anthropology.
4 units, winter quarter (GEROW) MTWTh 9

140. Comparative Social Systems.—Social structures and institutions of "nonliterate" peoples; comparison with Western social systems. Prerequisite: Anthropology 2, Sociology 1, or permission of instructor.
4 units, autumn quarter (UNDERWOOD) MTWTh 2

141. Anthropological Approaches to Religion and Philosophy.—These fields of creativity and experience among "nonliterate" peoples; significance for modern thought.
4 units autumn quarter (UNDERWOOD MTWTh 11

144. Mythology and Folklore.—These fields of creativity among "nonliterate" peoples; significance in the development of human thought; comparisons with Western literature.
4 units, winter quarter (GEROW) MTWTh 11

145. The Arts in Nonliterate Societies.—Emphasis on the forms and functioning of the visual arts; some materials on music, and opportunities for special work in this field.
4 units, spring quarter (KEESING) MTWTh 9

150. Peoples of the Pacific.—Racial, linguistic, and cultural backgrounds and characteristics of the Malaysian and Oceanic islanders.
4 units, spring quarter (KEESING) MTWTh 11

152. Peoples of Asia.—Racial, linguistic, and cultural backgrounds and characteristics of the peoples of Asia exclusive of the Soviet Union.
4 units, spring quarter (GEROW) MTWTh 10

153. Peoples of the Soviet Union.—Racial, linguistic, and cultural backgrounds and characteristics of the peoples of both European and Asiatic Russia.
4 units, winter quarter (SIEGEL) [In alternate years; not given in 1954–55]

155. Indians of North America.—Racial, linguistic, and cultural backgrounds and characteristics of the Indian peoples of the United States and Canada; cultural relationships with Mexico.
3 or 4 units, winter quarter (SPINDLER) [In alternate years; not given in 1954–55]

156. Peoples of Middle America.—Racial, linguistic, and cultural backgrounds and characteristics of Indian and folk societies in this area.
4 units, spring quarter (SIEGEL) [In alternate years; not given in 1954–55]

157. Peoples of South America.—Racial, linguistic, and cultural backgrounds and characteristics of Indian and folk societies in this area.
4 units, spring quarter (UNDERWOOD) MTWTh 10

158. Cultural Problems in Latin America.—Survey of ethnic groups in this area. Emphasis upon their major cultural orientations, processes of cultural change. Effects of isolation, urbanization, and industrialization.
4 units, spring quarter (SIEGEL) [In alternate years; not given in 1954–55]

163. Cultural Dynamics.—Anthropological contributions to the understanding of the dynamics of cultural growth and change. Prerequisite: Anthropology 2, Sociology 1, or permission of instructor.
4 units, winter quarter (SPINDLER) MTWTh 10

164. Culture and Personality.—Anthropological contributions to understanding the role of culture in personality development; comparative studies; present status of the problem. Prerequisite: Anthropology 2, Sociology 2, or Psychology 51.
4 units, spring quarter (SPINDLER) MTWTh 3

165. Problems of Administration in Pacific Dependencies.—Examination of some of the outstanding problems of government, development, and welfare, and of the varied national policies and administrative methods involved in handling them.
4 units, autumn quarter (KEESING) [In alternate years; not given in 1954–55]

190. Directed Individual Study.—For undergraduate students with special needs, and showing capacity to do independent work. Prerequisite: consent of instructor.
(DEPARTMENT FACULTY) By arrangement

COURSES PRIMARILY FOR GRADUATE STUDENTS

215. Museum Methods.—Directed work based on collections in the Stanford Museum. Prerequisite: adequate background in anthropology, and consent of the instructional staff.
2 or 3 units, winter and spring quarters (GEROW) By arrangement

220. Advanced Ethnology.—Continued work, at the graduate level, following up that given in Anthropology 120. Prerequisite: graduate standing or permission of instructor.
(DEPARTMENT FACULTY) By arrangement

230. Advanced Social Anthropology.—Continued work, at the graduate level, following up that given in Anthropology 130. Prerequisite: graduate standing or permission of instructor.
(KEESING, SIEGEL, SPINDLER) By arrangement

231. Advanced Prehistoric Archaeology.—Continued work, at the graduate level, following up that given in Anthropology 131. Prerequisite: graduate standing or permission of instructor.
(GEROW) By arrangement

232. Advanced Physical Anthropology.—Continued work, at the graduate level, following up that given in Anthropology 132. (Anthropology graduate students are also urged to take Anatomy 114: Practical Anatomy.) Prerequisite: graduate standing or permission of instructor.
(———) By arrangement

235. Advanced Anthropological Linguistics.—Continued work following up that given in Anthropology 135. Prerequisite: anthropology graduate standing or permission of instructor.
(GEROW) By arrangement

250. Methods in Cultural Anthropology.—Discussion of trends in problems and methods in cultural anthropology. Illustrative case studies.
4 units, autumn quarter (SIEGEL) [Not given in 1954–55]

251. Seminar in Research in Cultural Anthropology.—Analysis of selected studies for guidance and training in research.
4 units, winter quarter (KEESING) Th 2-5

253. Seminar in Linguistic Field Methods.—Analysis, with use of informants, of non-Indo-European language materials.
4 units, spring quarter (GEROW) [In alternate years; not given in 1954-55]

255. Psychologically Oriented Techniques in Field Work.—Prerequisite: permission of instructor.
3 units, spring quarter (SPINDLER) [In alternate years; not given in 1954-55]

260. Archaeological Methods.—Including field work on local California archaeology. Prerequisite: permission of instructor.
3 units, autumn quarter (GEROW) By arrangement

300. Directed Research.—Special research projects undertaken for course credit.
(DEPARTMENT FACULTY) By arrangement

309. Directed Graduate Research.—"Apprenticeship" plan. Research undertaken as alternative to the Master's thesis.
(DEPARTMENT FACULTY) By arrangement

310. Thesis.—Research undertaken in connection with the Master's thesis or the doctoral dissertation.
(DEPARTMENT FACULTY) By arrangement

[**Social Anthropology in Education.**—See Education 416.]

Graduate students in anthropology may, on consent of their department advisers, count for anthropology credit certain sociology courses and seminars relevant to their special interests. All anthropology graduates working for the Master of Arts degree are recommended to take Sociology 255, Methods of Social Research. For the graduate statistics requirement in anthropology, Statistics 50 is recommended. Graduate courses offered in other departments and institutes within the University, such as in Anatomy, Paleontology, Psychology, and the Hoover Research Institute, may also be elected for graduate credit provided the course concerned is approved by the adviser as fitting into the student's program.

SOCIOLOGY-ANTHROPOLOGY

The following course work at the graduate level is intended to provide training in problems common to the two disciplines represented in the department.

404. Seminar in Cultural and Social Research.—Prerequisite: consent of instructor.
3 units, winter quarter (BATESON) W 8 P.M.
3 units, spring quarter (BATESON) W 8 P.M.

410. Graduate Research in Social Change.
(DEPARTMENT FACULTY) By arrangement

414. Graduate Research in Cultural and Social Bases of Mental Health.
(BATESON) By arrangement

[**Social Foundations.**—See Education 110.]

[**Cultural Transmission.**—See Education 315.]

SPEECH AND DRAMA

LEE EMERSON BASSETT, JAMES GORDON EMERSON, Professors Emeriti
ELISABETH LEE BUCKINGHAM, Associate Professor Emeritus

HUBERT CROUSE HEFFNER (Dramatic Literature), VIRGIL ANTRIS ANDERSON, LELAND TAYLOR CHAPIN, H. DONALD WINBIGLER, Professors
WENDELL COLE, STANLEY T. DONNER, HAYES A. NEWBY, NORMAN PHILBRICK, F. COWLES STRICKLAND, Associate Professors
HELENE BLATTNER, HELEN W. SCHRADER, Assistant Professors
DELFORD BRUMMER, Technical Director
LEO HARTIG, ANTHONY HILLBRUNER, DOROTHY HUNTINGTON, ROBERT LOPER, VIRGINIA OPSVIG, GEORGE WILLEY, Instructors
MARIANNE E. CROWDER, Acting Instructor

CURRICULUM

The curriculum and the requirements for degrees in the Department of Speech and Drama are organized to provide opportunity for adequate training in the major fields of speech instruction, and also opportunities for teacher training. Its programs of study and its requirements for degrees are designed to provide, in co-operation with other departments and courses of study, a broad liberal education as well as specific professional training. In the training of a student, emphasis is placed by the department upon the acquirement of skill, as well as upon the acquirement of knowledge. In addition to opportunities for a liberal education, the work of the Department of Speech and Drama offers professional training or teaching; for the theater, including the various phases of theater arts; for the radio, including writing and performance; for public address and interpretative reading; and for audiology, voice science, and speech correction.

The courses in the departmental curriculum are numbered in accordance with the following scheme:

1 to 99, Lower Division
100 to 199, Upper Division
200 to 299, Advanced undergraduate and graduate
300 to 400, Graduate courses and seminars

The subject matter, areas, and nature of the courses are further indicated as follows:

1 to 9 on any level (1 to 9, 101 to 109, 201 to 209, etc.) are general
10 to 14, Radio
15 to 19, Teacher Training
20 to 29, Public Speaking
30 to 39, Interpretation
40 to 59, Speech Sciences, Speech Correction, etc.
60 to 99, Theater and Drama
    60 to 69, Acting and Directing
    70 to 79, Stage Production and Technical
    80 to 89, Children's Theater, Motion Pictures, Miscellaneous
    90 to 99, Dramatic Literature, Theater-History, Criticism

Lower Division students who are preparing to major in speech and drama should include in their Lower Division program at least the following basic courses: Speech and Drama 1, 20, and 30. Normally these basic courses should be completed *before* a student pursues other work within the department. The following courses are also recommended for prospective major students with a concentration in theater and drama: Speech and Drama 70, 71, 72, 74, and English 25.

ATTAINMENT EXAMINATIONS

Any student transferring to this department with credit in college courses similar to the basic courses—Speech and Drama 1, 20, and 30—may evaluate the credit by taking an attainment examination in these courses. Success in passing an attainment examination entitles the student to substitute a more advanced course for the basic course.

Students entering with advanced standing who present credit in any basic required course must pass the attainment examination before department credit is allowed or before being excused from the course. The examinations are given during the second week of the quarter and are designed to test (1) adequate comprehension of subject matter covered in the course, and (2) attainment of an adequate oral skill.

Students wishing to take attainment examinations should consult with the executive secretary during registration week.

ORAL SKILLS EXAMINATION

All students who are candidates for a degree with a major in speech and drama are required to demonstrate, before a committee of the department, their satisfactory attainment in oral skills through a platform test involving speaking and reading. For *undergraduates*, this requirement should be fulfilled during the last quarter of the junior year. For *graduates*, this requirement must be fulfilled during the first quarter they are in residence. This examination is usually given during the fifth week of the quarter. The secretary has application blanks and descriptive matter concerning the examination. No undergraduate student is eligible to take the examination until he has satisfactorily completed the basic courses 1, 20, 30, and 101, or their equivalents.

Candidates who have shown deficiency in the oral skills examination are required to comply with the recommendations of the examining committee before being permitted to repeat the examination.

DEGREE OF BACHELOR OF ARTS

The requirements for the degree of Bachelor of Arts with a major in speech and drama are planned to allow the student the widest possible latitude in the development of his special aptitudes and interests. A minimum program is required of all students. Beyond this minimum requirement, the student is permitted to elect in accordance with his interests either a general program in speech and drama or a professional program in speech re-education, teacher training, or theater and drama. The requirements for the degree of Bachelor of Arts may be summarized as follows:

1. The satisfactory completion, with an average grade of C or better, of not less than 45 units in speech and drama courses, including the following minimum general requirement: Speech and Drama 1, 20, 30, and 101.

2. The satisfactory completion of one of the following programs:

I. General Speech and Drama—Speech and Drama 123 or 223, 121, 130, 148, 242, and a sequence of 15 or 16 units from one of the following:
  a) Public Speaking 125, 226, 228, and approved electives
  b) Interpretation 131, 230, 238, and approved electives
  c) Speech Re-education 149, 245, 253, and approved electives
  d) Radio and Television 10, 11, 13, 111, 210, 211, 212, 213
  e) Theater and Drama
    1) Acting and Directing 61, 161, 163, 191 or 192, 294
    2) Literature and Analysis 190, 191, 192, 294
    3) Technical Production 70, 71, 74, and approved electives
    4) Cinema 85, 185, 285, 212 or 294

II. Speech Re-education—Speech and Drama 120 or 123 (130 or 61 may be substituted), 121 or 226, 148, 149, 150, 242, 253, 255, and electives

III. Teacher Training—Speech and Drama 10, 70, 71, 74, 123 or 223, 121 or 125, 130, 148, 149 or 217, 163, 190 or 191, 253

IV. Theater and Drama
  a) Speech and Drama 61, 62, 70, 71, 74, 163, 190, 191, 192, 294

3. The completion of the oral skills examination. (See page 285 regarding this examination.)

4. The satisfactory completion, with an average grade of C or better, of a minor program of not less than 20 units of advanced course work closely allied to the field of concentration, chosen from courses offered in a department or departments other than Speech and Drama. The minor program must be chosen with the advice and approval of the student's faculty adviser from among those programs approved by the faculty of the department.

5. The satisfactory completion of at least two quarters of a second-year reading course of a foreign language aside from elementary courses (two years in high school or one in the University).

Students who enter as juniors may be required to spend more than two years in the completion of requirements for the major program. Students in junior colleges, who expect to transfer to the Upper Division as major students in speech and drama, are advised while in junior college to pursue the study of a foreign language, to take an elementary survey course in Shakespeare, or a course in English poetry, and to take, if possible, a course in extemporaneous speaking.

No student may be recommended for a degree who has not spent a minimum of three quarters (one year) of full-time academic work in the department as an Upper Division student.

Special Major Program for Honors Candidates in Humanities.—Students who are planning to take the special Honors Program in Humanities (see pages 209–211 may fulfill the requirements for their major in speech and drama by the following:

1. The satisfactory passing of the oral skills examination. (See page 285 regarding this examination.)

2. Satisfactory completion of one of the following programs:

I. General Speech and Drama—Speech and Drama 1, 20, 30, 101, 123 or 223, 121, 130, 131, 148, 190 or 191, 226, 242 or 149

II. Theater and Drama (Directing)—Speech and Drama 60, 77, 161, 163, 171, 190, 191, 192, 263, 264, 294, and English 25

III. Theater and Drama (Dramatic Literature)—Speech and Drama 60, 163, 171, 190, 191, 192, 291, 292, 294, English 25, 171, and 3 units of electives in speech and drama.

ADVANCED DEGREES

Any qualified student may enter upon graduate work at Stanford University, with the intention of becoming a candidate for a higher degree in speech and drama, who has received a Bachelor's degree from a college or university of accredited standing. Admission to courses of advanced standing does not, however, imply admission to candidacy for an advanced degree. Students who are deficient in their undergraduate training in the fields of speech and drama will be required to make up such deficiencies.

MASTER OF ARTS

Before admission to candidacy for the Master of Arts degree, a student takes in his first quarter of residence diagnostic or program-planning tests, consisting of written examinations and an oral skills examination. The written examinations covering the basic fields of voice and diction, public speaking, and oral reading on an elementary level, and covering the specific field of the student's major interest in a more extensive manner, are normally given within the first four weeks of the quarter. The oral skills examination for graduate students is normally given in the fifth week. Entering graduate students are required to take these examinations during the first quarter of residence. (See page 285 for a general statement regarding the oral skills examination.)

On the basis of the results of the diagnostic tests the student in consultation with a faculty adviser plans a complete program of study and selects a thesis subject. This program of study and the outline of the proposed research for the thesis should be submitted on proper forms to the departmental Committee on Graduate Study for approval. There is no set program of graduate courses rigidly required of all prospective candidates for the Master of Arts degree. Each student with his adviser plans in terms of his previous training as exemplified in the diagnostic examinations and in terms of his goals an individual program to meet the requirements of the department.

Admission to candidacy is granted by the University Committee on Graduate Study on the basis of a formal application approved in writing by the department. Upon securing from the department the approval of his program and thesis subject, the student should immediately file an application for admission to candidacy with the Registrar. This application must be filed not later than the fourth week of the quarter preceding that in which the candidate expects to receive his degree.

Requirements for the Degree.—Candidates for the degree of Master of Arts in speech and drama must present a minimum of 40 units of graduate work and must spend at least one year or three summer quarters in full-time residence study. This program may include course work offered in other departments of the University. Of these units, not less than 6 nor more than 9 may be devoted to a thesis or project. For more than 6 units, however, the candidate must petition the departmental Committee on Graduate Study. Students are required to maintain a satisfactory scholastic rating in all course work. Candidates are normally required to plan their programs to include a major from one of the following four fields of speech and drama: public speaking, interpretation, speech re-education, theater and drama, and to include a minor from a second one of these fields. A student whose undergraduate training has been of exceptionally high quality and who possesses outstanding abilities in speech and drama may, upon petition approved by the departmental Committee on Graduate Study, be permitted to plan a less specialized program of work for the degree. Lower Division courses required of a candidate because of deficiencies in undergraduate preparation, as revealed by a preliminary examination, may not be used in satisfying the requirement of 40 units of advanced work. Only the exceptional student with an excellent undergraduate training should expect to fulfill the requirements for the degree within the minimum specifications of residence and courses. Full instructions concerning the Master of Arts program and review bibliographies should be obtained from the office of the department.

Examinations.—Candidates who have shown deficiency in the preliminary oral skills examination will be required to demonstrate a satisfactory attainment in oral skills prior to being admitted to the comprehensive Master's examinations. At the end of the last quarter of residence each candidate will be required to pass satisfactory comprehensive written examinations, demonstrating his command of that field or those fields of speech in which he has elected to study. Candidates who fail to pass these examinations may take them again but are disqualified by a second failure.

Candidates who fail to present an approved thesis in final form within one calendar year after passing the comprehensive examinations may be required to repeat the comprehensive examinations before being recommended for a degree. If the length of time intervening is beyond one calendar year, additional course work may be required before repetition of the examinations.

Thesis or Project.—The thesis or research project must be carried on under the direction of a member of the faculty of the Department of Speech and Drama or under the direction of a member of the faculty of an allied department at the discretion of the adviser. Choice of subject and first steps in the work should be begun immediately after completion of the preliminary examinations and normally should not be delayed beyond the first quarter in residence. An adequate first draft must be submitted to the adviser not later than the end of the fourth week of the last quarter of resident study. The final draft must be submitted three weeks prior to the end of the quarter in which the degree is expected. After acceptance by the department, three copies of the thesis or project must be presented for acceptance by the University Committee on Graduate Study. The thesis form and time of presentation prescribed by that Committee must be adhered to.

A limited number of students with major interest in theater and drama may, upon selection by the theater and drama staff, present a production project in lieu of the regular research thesis. Such a project consists of the selection and direction of a production for public presentation in the Studio Theater. The production book in proper form is presented in lieu of the regular thesis. Students who elect this production program must plan to spend six quarters in residence. Full particulars of the program may be obtained from the executive secretary of the department.

The Department of Speech and Drama offers a special program of work in radio and television leading to the Master's degree. Enrollment in this program is limited to not more than twelve students per year. Upon completion of the academic requirements for the degree, which correspond to the requirements described above, each candidate is required to spend a three months' internship in a professional radio or television station within the vicinity of Stanford Unversity. For further particulars, write to the Executive Secretary of the Department.

Doctor of Philosophy

The department accepts a limited number of students who wish to pursue advanced studies with the intention of becoming candidates for the Doctor of Philosophy degree. In the program leading to the doctorate in speech and drama primary emphasis is placed upon training for research. A prospective candidate may plan a program with a concentration in one of the following three fields: theater and drama, voice science and speech re-education, rhetoric and public address.

The University regulations defining the requirements apply to all students who wish to become candidates for this degree. These requirements may be summarized as follows: A minimum of three years (nine quarters) of graduate study beyond the Bachelor's degree, with a minimum of one year (three quarters) spent in graduate study at Stanford; the completion of the requisite examinations, including examinations demonstrating a reading knowledge of two foreign languages; the submission of an acceptable dissertation. Ph.D. candidates in theater and drama and public speaking are required to pass the language examination in two languages, one of which must be French or German: (*a*) The foreign language examination in one of the required languages should be passed within the first quarter of residence; (*b*) the second foreign language examination should be passed two quarters previous to the quarter in which the candidate takes his departmental written examinations for the Ph.D. degree. (Exceptions: Substitution of 15 units in an area of study not related to the major field of concentration and which will be permitted only after the candidate has selected the subject of his dissertation and has justified the substitution by an explanation which clearly demonstrates the need for only one foreign language for his dissertation. Furthermore, the explanation must justify clearly the use of the 15 units of substituted courses in relation to the candidate's academic intentions.) The program of courses and research is individually planned for each student. A full outline of procedures and requirements may be obtained upon application to the executive secretary of the department.

TEACHING CREDENTIALS

Students interested in the program of study leading to a Teaching Credential with a major in speech and drama should consult pages 32–33 and the credential secretary of the School of Education.

Special Credential in Speech Correction.—The Department of Speech and Drama in conjunction with the School of Education offers a program leading to a Special Credential in the Correction of Speech Defects. The holder of this credential is authorized to teach speech correction in the public schools of California. For further information consult the credential secretary of the School of Education, or the Director of the Speech and Hearing Clinic.

SPEECH AND HEARING CLINIC

Throughout the school year, including the summer quarter, a speech and hearing clinic is maintained for the purpose of diagnosing and treating speech defects, foreign accents, and hearing problems. Individual instruction is provided for students suffering from minor disturbances of voice and speech as well as for those with more serious disorders. Special attention is given to the problem of stuttering, through group projects and individual training. In co-operation with the Student Health Service of the University, the Speech and Hearing Clinic conducts a diagnostic and testing program for students who have suspected hearing disorders. For those students who are acoustically handicapped, the clinic offers individual and group instruction in lip reading, evaluation of hearing aids and instruction in their use, and assistance with speech problems arising from the hearing disorder. The services of the Speech and Hearing Clinic are extended without charge to all students of the University in need of such corrective treatment.

SUMMER QUARTER

The summer quarter courses regularly scheduled in the speech and drama curriculum are listed below. Additional courses will be published in the *Summer Quarter Bulletin* in February 1954.

Some courses which are repeated in the summer quarter carry decreased credit.

GENERAL COURSES

General Lower Division courses open to all interested students without prerequisites include Speech and Drama 1, 2, 20, 25, 30, 48, 60, 61, 62, 70, 71, 74, 75, 79, 85.

1. Training the Speaking Voice I.—A basic course, including theory and practice, open to all students desiring to improve their normal speaking voices.
3 units, any quarter (Huntington and staff) MWF 8, 9, 10, 11, 1

2. Training the Speaking Voice II.—Stresses the application of speech skills to practical situations and the establishment of proper habits of good speech.
3 units, autumn and *spring quarters (Huntington) MWF 9

100. Individual Instruction.—Continued study under direction and guidance in fields or subjects of special interest. Credits limited to 6 units.
2 or 3 units, any quarter (Staff) [Not given in 1954–55]

101. Voice Training for Public Performance.—An advanced course in the development of voice and diction adequate to the demands of the stage, radio, or public platform. Prerequisite: Speech and Drama 1, or equivalent, or consent of instructor.
3 units, autumn and *spring quarters (Blattner) MWF 1

105. Public Performance. — Guidance in preparation and delivery of speeches and readings, with opportunities provided for their presentation before public audiences.
1 or 2 units, autumn, *winter, and *spring quarters (Hillbruner) By arrangement

300. Introduction to Graduate Study.—A course in bibliography and methods for students of speech and drama. Required of graduate students in speech and drama.
2 units, autumn and *spring quarters (Heffner, Philbrick) TTh 5–6

308. Research.—Special problems in the field of speech and drama under the supervision of some member of the department.
1 to 4 units, any quarter (Staff) [Not given in 1954–55]

309. Master of Arts Thesis.
Any quarter (Staff) By arrangement

400. Doctoral Research.
Any quarter (Staff) By arrangement

RADIO AND TELEVISION

10. Introduction to Radio and Television.—A broad fundamental treatment of the nature, organization, and methods of the media. Some basic microphone work.
3 units, autumn and *spring quarters (Donner, Willey) MWF 9

11. Radio Announcing Techniques.—A practical course covering commercial, news, musical programs, interviews, audience-participation, sports, and special events announcing. Prerequisite: Speech and Drama 10.
3 units, autumn quarter (DONNER, WILLEY) MWF 10

13. Radio Writing Techniques.—Covers the forms of radio writing: commercial, music, talk, audience-participation, feature, and documentary. Prerequisite: Speech and Drama 10.
3 units, autumn quarter (WILLEY) MWF 1

110. Projects in Radio Broadcasting.—Individual assignments in radio for advanced students. Prerequisite: Consent of instructor. Limited to total of 6 units.
1 to 3 units, autumn,*winter, and *spring quarters (DONNER, WILLEY)
T 1 (and by arrangement)

111. Radio Acting and Production Techniques.—A beginning course designed to illustrate acting and production of the simpler kinds of radio shows. Prerequisite: Speech and Drama 10.
3 units, winter quarter (DONNER) MWF 10

113. Radio News and Special Events.—Preparation of radio newscasts, writing and editing press association copy, sports, special events, and news analyses. (See Journalism 160.) Prerequisites: Speech and Drama 10 and 13, or consent of instructor.
3 units, winter quarter (DONNER) [Not given in 1954–55]

210. Problems in Television.—A course exploring the background, means of production, writing, and acting in television. Guest lecturers will be invited from allied fields of the University and from the industry. By permission of instructors. Limited to twenty advanced students.
3 units, autumn and *spring quarters (DONNER, WILLEY) MWF 2

211. Advanced Radio Production and Directing.—An advanced course in the production of the more difficult radio programs: variety, audience-participation, documentary, and dramatic. By permission of instructor.
4 units, spring quarter (DONNER) MWF 10; Lab. by arrangement

212. Projects in Television Performance.— A course designed to illustrate and to give practice in acting and the various kinds of television participation and performance. By permission of instructor.
3 units, spring quarter (DONNER, WILLEY) MWF 3–5

213. Advanced Radio Dramatic Writing.—A course in creative dramatic writing for qualified students. Speech and Drama 294 and 295 recommended. By permission of instructor.
3 units, spring quarter (DONNER) MWF 1

310. Proseminar in Radio and Television.—An introduction to the various types of research and research methods in radio and television. Required of graduate students specializing in radio and television.
4 units, winter quarter (DONNER) By arrangement

311. Seminar in Radio and Television.—Directed studies in areas of bibliography, audience research, program analysis, production problems, and the impact of these media on society.
4 units, spring quarter (DONNER) By arrangement

STANFORD SUMMER RADIO AND TELEVISION INSTITUTE

R200. Broadcasting and Telecasting in the United States.—A survey course on the nature and responsibilities of the media, the structure of the industry, problems of regulation, and the general pattern of radio and television broadcasting. Required of all students.
3 units, summer quarter (DONNER, GUEST LECTURERS, AND STAFF) By arrangement

R201. The Applications of Radio and Television.—The media as tools for school and community use. A workshop and demonstration course. (Listed also as Education 341.)
2 units, summer quarter (DONNER AND STAFF) By arrangement

R202. Radio Broadcasting Laboratory.—Direct application of all radio course work will be made by the student through management and operation of the intercampus radio station KZSU. On-the-air experience in all forms of broadcasting, including program planning, announcing, music, drama, news and special events, and engineering. Recommended for all students.
(No credit), summer quarter (DONNER AND STAFF) By arrangement

R204. Radio Program and Production Techniques.—A co-operative course designed to illustrate major program forms and to provide opportunity for experimenting with various types included in local station operation. Program forms to be considered: world and local news; sports; special events; live and recorded music; agricultural features; women's features; religious programs; discussions; public service for community agencies. Professionals from the KNBC staff will present a wide range of production problems.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R206. Music in Radio and Television.—An orientation course which will deal with the various aspects of popular and classical music in broadcasting and in production.
2 units, summer quarter (DONNER AND STAFF) By arrangement

R207. Radio Writing Techniques.—Covers the forms of radio writing: commercial, music, talk, audience-participation, feature, and documentary.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R208. Advanced Radio and Television Dramatic Writing.—A course in creative dramatic writing for qualified students. Consent of instructor.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R209. Radio and Television News and Special Events.—A practical course to train students for work in the radio and/or television newsroom; the gathering, selection, rewriting, and editing of news for broadcast; production and direction of special event broadcasts and telecasts. Limited to 12 students.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R210. Radio and Television Selling and Advertising.—A course giving consideration to audience analysis, sales promotion, time buying, agency relations, and program sales.
2 units, summer quarter (DONNER AND STAFF) By arrangement

R211. Radio and Television Program Planning and Scheduling.—A seminar dealing with current problems of program planning and building, and local radio station operation. Limited to 12 students.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R212. Survey of Television.—A course exploring the electronic background, means of production, and writing and acting in television. Guest lecturers will be invited from allied fields of the University and from the industry.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R213. Television Production Problems.—A course exploring and attempting solutions for all manner of actual station production problems. Limited to those who have had television work.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R214. Television Writing and Production.—Practice in writing commercials and various kinds of shows under the exacting requirements of television production. R212 should be taken concurrently.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R215. Film for Television.—A course in the theory and practice of making and using film for television. Camera work, filming of commercials and film inserts, and making films under suitable conditions for television will be part of the course.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R216. Design, Lighting, and Staging for Television.—This course will consider matters of design concerning all things that come before the television camera. Both the principles and methods of staging and lighting the television program will be presented.
3 units, summer quarter (DONNER AND STAFF) By arrangement

TEACHER TRAINING

115. Speech for the Classroom Teacher.—Principles and methods of expository speaking for non-speech majors working for teaching credentials.
3 units, each quarter (SCHRADER) MWF 11, MWF 1

216. Supervised Training for Teaching Assistants.—Open to qualified seniors and graduate students. May be repeated. Credits limited to a total of 4.
1 to 4 units, any quarter (SCHRADER AND STAFF) By arrangement

217. Speech Correction in the Classroom.—Recognition, diagnosis, and treatment of the most common speech problems found among the school population.
4 units [Not given in 1954–55]

[**Student Teaching in Speech Correction.**—See Education 242.]

[**Student Teaching in Junior College.**—See Education 248.]

[**Curriculum and Instruction in Speech.**—See Education 286*a* and 286*b*.]

[**Individual Study in Curriculum and Instruction.**—See Education 486*i*.]

[**Curriculum and Instruction in Junior College.**—See Education 289.]

RHETORIC AND PUBLIC SPEAKING

20. Public Speaking I.—A basic course stressing practice in extemporaneous speaking, with emphasis on organization and content.
3 units, any quarter (CHAPIN AND STAFF) General sessions [1 hour] T 8, M 9, T 10, Th 11; Section meetings [2 hours] MW 8, 9, 10, 11, 1, 2; TTh 8, 9, 10, 11, 1, 2

25. Introduction to Discussion and Debate.—A basic practical course with the emphasis upon an orientation into the allied disciplines of problem-solving discussion and effective use of argument in debate.
2 units, autumn quarter (HILLBRUNER) M 3–5

120. Public Speaking II.—Continuation of Public Speaking I. Emphasis on speech composition, style, and audience response.
3 units, winter and *spring quarters (HILLBRUNER) MWF 10

121. Argumentation.—The theory of argumentation, with practice in the preparation of briefs and in the construction of arguments.
3 units, autumn quarter (CHAPIN) MWF 10

122. Pre-Legal Argumentation.—Case method applied to the study of legal and general argument. Practice in case abstracting and brief making. Designed for pre-legal students. Open to others.
4 units [Not given in 1954–55]

123. Contemporary Public Address.—The speeches of Churchill, Roosevelt, and other prominent speakers of the twentieth century; their biographies, the issues with which they are identified, and their contributions to contemporary public address.
3 units, winter quarter (CHAPIN, SCHRADER) MWF 11

R201. The Applications of Radio and Television.—The media as tools for school and community use. A workshop and demonstration course. (Listed also as Education 341.)
2 units, summer quarter (DONNER AND STAFF) By arrangement

R202. Radio Broadcasting Laboratory.—Direct application of all radio course work will be made by the student through management and operation of the intercampus radio station KZSU. On-the-air experience in all forms of broadcasting, including program planning, announcing, music, drama, news and special events, and engineering. Recommended for all students.
(No credit), summer quarter (DONNER AND STAFF) By arrangement

R204. Radio Program and Production Techniques.—A co-operative course designed to illustrate major program forms and to provide opportunity for experimenting with various types included in local station operation. Program forms to be considered: world and local news; sports; special events; live and recorded music; agricultural features; women's features; religious programs; discussions; public service for community agencies. Professionals from the KNBC staff will present a wide range of production problems.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R206. Music in Radio and Television.—An orientation course which will deal with the various aspects of popular and classical music in broadcasting and in production.
2 units, summer quarter (DONNER AND STAFF) By arrangement

R207. Radio Writing Techniques.—Covers the forms of radio writing: commercial, music, talk, audience-participation, feature, and documentary.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R208. Advanced Radio and Television Dramatic Writing.—A course in creative dramatic writing for qualified students. Consent of instructor.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R209. Radio and Television News and Special Events.—A practical course to train students for work in the radio and/or television newsroom; the gathering, selection, rewriting, and editing of news for broadcast; production and direction of special event broadcasts and telecasts. Limited to 12 students.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R210. Radio and Television Selling and Advertising.—A course giving consideration to audience analysis, sales promotion, time buying, agency relations, and program sales.
2 units, summer quarter (DONNER AND STAFF) By arrangement

R211. Radio and Television Program Planning and Scheduling.—A seminar dealing with current problems of program planning and building, and local radio station operation. Limited to 12 students.
4 units, summer quarter (DONNER AND STAFF) By arrangement

R212. Survey of Television.—A course exploring the electronic background, means of production, and writing and acting in television. Guest lecturers will be invited from allied fields of the University and from the industry.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R213. Television Production Problems.—A course exploring and attempting solutions for all manner of actual station production problems. Limited to those who have had television work.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R214. Television Writing and Production.—Practice in writing commercials and various kinds of shows under the exacting requirements of television production. R212 should be taken concurrently.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R215. Film for Television.—A course in the theory and practice of making and using film for television. Camera work, filming of commercials and film inserts, and making films under suitable conditions for television will be part of the course.
3 units, summer quarter (DONNER AND STAFF) By arrangement

R216. Design, Lighting, and Staging for Television.—This course will consider matters of design concerning all things that come before the television camera. Both the principles and methods of staging and lighting the television program will be presented.
3 units, summer quarter (DONNER AND STAFF) By arrangement

TEACHER TRAINING

115. Speech for the Classroom Teacher.—Principles and methods of expository speaking for non-speech majors working for teaching credentials.
3 units, each quarter (SCHRADER) MWF 11, MWF 1

216. Supervised Training for Teaching Assistants.—Open to qualified seniors and graduate students. May be repeated. Credits limited to a total of 4.
1 to 4 units, any quarter (SCHRADER AND STAFF) By arrangement

217. Speech Correction in the Classroom.—Recognition, diagnosis, and treatment of the most common speech problems found among the school population.
4 units [Not given in 1954–55]

[**Student Teaching in Speech Correction.**—See Education 242.]

[**Student Teaching in Junior College.**—See Education 248.]

[**Curriculum and Instruction in Speech.**—See Education 286*a* and 286*b*.]

[**Individual Study in Curriculum and Instruction.**—See Education 486*i*.]

[**Curriculum and Instruction in Junior College.**—See Education 289.]

RHETORIC AND PUBLIC SPEAKING

20. Public Speaking I.—A basic course stressing practice in extemporaneous speaking, with emphasis on organization and content.
3 units, any quarter (CHAPIN AND STAFF) General sessions [1 hour] T 8, M 9, T 10, Th 11; Section meetings [2 hours] MW 8, 9, 10, 11, 1, 2; TTh 8, 9, 10, 11, 1, 2

25. Introduction to Discussion and Debate.—A basic practical course with the emphasis upon an orientation into the allied disciplines of problem-solving discussion and effective use of argument in debate.
2 units, autumn quarter (HILLBRUNER) M 3–5

120. Public Speaking II.—Continuation of Public Speaking I. Emphasis on speech composition, style, and audience response.
3 units, winter and *spring quarters (HILLBRUNER) MWF 10

121. Argumentation.—The theory of argumentation, with practice in the preparation of briefs and in the construction of arguments.
3 units, autumn quarter (CHAPIN) MWF 10

122. Pre-Legal Argumentation.—Case method applied to the study of legal and general argument. Practice in case abstracting and brief making. Designed for pre-legal students. Open to others.
4 units [Not given in 1954–55]

123. Contemporary Public Address.—The speeches of Churchill, Roosevelt, and other prominent speakers of the twentieth century; their biographies, the issues with which they are identified, and their contributions to contemporary public address.
3 units, winter quarter (CHAPIN, SCHRADER) MWF 11

125. Public Discussion.—The methods of discussion applied to contemporary problems.
3 units, winter and *spring and summer quarters (SCHRADER, CHAPIN) MWF 10

126. Debate.—An advanced practical course in the utilization of argument in school and intercollegiate debate with the stress on research, logical analysis, and effective substantiation and communication of ideas dealing with national issues. Consent of instructor.
1 or 2 units, autumn, *winter, and *spring quarters (HILLBRUNER) By arrangement

222. Speech Composition.
3 units (SCHRADER) [Not given in 1954–55]

223. American Public Address.—A critical study of the speeches of outstanding American statesmen, educators, and clergymen, considering especially the sources of their effectiveness.
3 units, winter quarter (CHAPIN, ———) MWF 9

225. Persuasion and Public Opinion.—The influence of public discussion and propaganda in shaping public opinion.
2 or 3 units, winter quarter (CHAPIN) M 3–5 (and one hour by arrangement)

226. Great Speakers and Rhetoricians.—Study of selected great speakers and rhetoricians from the Greek and Roman periods to the present. Upper Division and graduate students.
4 units, winter quarter (———) MTWF 10

228. American Speakers.—The history of ideas through the study of great American speakers.
4 units, summer quarter (CHAPIN, ———) MTWThF 9

229. British Debate and Public Address.—The history of British debating societies, such as the Oxford Union, the Dialectic and Speculative societies. Eighteenth and nineteenth century Parliamentary orators.
2 units, autumn quarter (CHAPIN, ———) TTh 11

320. Proseminar in Rhetoric and Public Speaking.—An introduction to the various types of research and research methods in rhetoric and public speaking. Required of graduate students specializing in rhetoric and public speaking.
4 units, spring quarter (CHAPIN, SCHRADER) TTh 2–4

321. Seminar in Rhetoric and Public Speaking.—Directed studies in classical, medieval, and modern rhetoric and dialectic and in the history of oratory. May be repeated for credit.
4 units, summer quarter (CHAPIN, SCHRADER) By arrangement

323. Seminar in American Public Address.
4 units, winter quarter (CHAPIN, SCHRADER) MW 2–4

324. Eighteenth Century Scots.—Studies in rhetoric and public speaking.
4 units (CHAPIN) [Not given in 1954–55]

328. Seminar in Classical Rhetoric.
4 units, spring quarter (GRESSETH) By arrangement

329. Seminar in British Public Address.
4 units, autumn quarter (CHAPIN) By arrangement

[Business and Professional Speaking.—See Business 301.]

INTERPRETATION OF LITERATURE

30. Fundamentals of Oral Reading I.—A basic course stressing the communication of thought and feeling from the printed page to others.
3 units, any quarter (BLATTNER, LOPER) MWF 8, 9, 10, 1

130. Fundamentals of Oral Reading II.—A continuation of Speech and Drama 30, with emphasis on analysis and technique of various forms of poetry and prose. Prerequisite: Speech and Drama 30.
3 units, autumn, *winter, and *spring quarters (BLATTNER) MWF 8, 10

131. Interpretation of Literature.—Oral reading of poetry and prose, with emphasis on literary values which may be expressed in oral interpretation. Prerequisite: Speech and Drama 130, or consent of instructor.
3 units, autumn and *spring quarters (BLATTNER) MWF 11

230. Advanced Interpretation of Literature.—Program planning and the preparation of materials for public presentation. Prerequisite: Speech and Drama 131, or consent of instructor.
4 units, winter quarter (BLATTNER, LOPER) TTh 2–4

238. The Art of Interpretation.—A consideration of theories on the art of interpretation.
4 units, autumn and *summer quarters (BLATTNER, LOPER) TTh 2–4

239. Special Problems in Interpretation.—A detailed study of a selected subject dealing with some aspect of the field of interpretation.
3 units, spring quarter (BLATTNER, LOPER) TTh 2–3:30

330. Seminar in Interpretation.—The material for study will vary from year to year; hence, the seminar may be repeated for credit.
4 units, winter and *summer quarters (BLATTNER, LOPER) By arrangement

SPEECH SCIENCES, SPEECH CORRECTION, AND AUDIOLOGY

40. Speech Clinic.—Remedial work in speech defects, foreign accent, and hearing problems. Open to all students in need of corrective treatment.
No credit, any quarter (ANDERSON, NEWBY, AND STAFF) By arrangement

47. English Communication for Foreign Students.—For the foreign students interested in improving their pronunciation and understanding of English speech and their use of the written language.
6 units, autumn quarter (HUNTINGTON AND STAFF) MTWThF 4
(and one hour by arrangement)

48. English Communication for Foreign Students.—A continuation of Speech and Drama 47.
3 units, winter quarter (HUNTINGTON AND STAFF) MW 4
(and one hour by arrangement)

49. English Communication for Foreign Students (Advanced).—Emphasis is placed upon fluency and ability to communicate effectively in both spoken and written English.
3 units, autumn quarter (HUNTINGTON AND STAFF) TTh 3
(and one hour by arrangement)
3 units, winter quarter (HUNTINGTON AND STAFF) TTh 4
(and one hour by arrangement)
3 units, spring quarter (HUNTINGTON AND STAFF) MW 4
(and one hour by arrangement)

148. Principles of Phonetics.—English phonetics as applied to articulation, standards of pronunciation, the teaching of speech, and speech correction.
4 units, autumn quarter (ANDERSON) MTWF 9

149. Speech Re-education.—Fundamental training in the recognition and treatment of the more common types of vocal and articulatory defects.
4 units, autumn quarter (ANDERSON) MTWF 11

150. Introduction to Audiology: Hearing and Deafness.—Anatomy, physiology, and acoustics of hearing; survey of the field of audiology.
4 units, autumn quarter (HUNTINGTON) MWThF 1
4 units, *summer quarter (———) MTWThF 1

151. Basic Audiometry.—Theory and practice in administering individual and group hearing tests, with emphasis on public school audiometry.
3 units, winter quarter (NEWBY) MWF 10

153. Stuttering.—Theories of stuttering and modern approaches to therapy.
3 units, spring quarter (ANDERSON) [Not given in 1954–55]

125. Public Discussion.—The methods of discussion applied to contemporary problems.
3 units, winter and *spring and summer quarters (Schrader, Chapin) MWF 10

126. Debate.—An advanced practical course in the utilization of argument in school and intercollegiate debate with the stress on research, logical analysis, and effective substantiation and communication of ideas dealing with national issues. Consent of instructor.
1 or 2 units, autumn, *winter, and *spring quarters (Hillbruner) By arrangement

222. Speech Composition.
3 units (Schrader) [Not given in 1954–55]

223. American Public Address.—A critical study of the speeches of outstanding American statesmen, educators, and clergymen, considering especially the sources of their effectiveness.
3 units, winter quarter (Chapin, ———) MWF 9

225. Persuasion and Public Opinion.—The influence of public discussion and propaganda in shaping public opinion.
2 or 3 units, winter quarter (Chapin) M 3–5 (and one hour by arrangement)

226. Great Speakers and Rhetoricians.—Study of selected great speakers and rhetoricians from the Greek and Roman periods to the present. Upper Division and graduate students.
4 units, winter quarter (———) MTWF 10

228. American Speakers.—The history of ideas through the study of great American speakers.
4 units, summer quarter (Chapin, ———) MTWThF 9

229. British Debate and Public Address.—The history of British debating societies, such as the Oxford Union, the Dialectic and Speculative societies. Eighteenth and nineteenth century Parliamentary orators.
2 units, autumn quarter (Chapin, ———) TTh 11

320. Proseminar in Rhetoric and Public Speaking.—An introduction to the various types of research and research methods in rhetoric and public speaking. Required of graduate students specializing in rhetoric and public speaking.
4 units, spring quarter (Chapin, Schrader) TTh 2–4

321. Seminar in Rhetoric and Public Speaking.—Directed studies in classical, medieval, and modern rhetoric and dialectic and in the history of oratory. May be repeated for credit.
4 units, summer quarter (Chapin, Schrader) By arrangement

323. Seminar in American Public Address.
4 units, winter quarter (Chapin, Schrader) MW 2–4

324. Eighteenth Century Scots.—Studies in rhetoric and public speaking.
4 units (Chapin) [Not given in 1954–55]

328. Seminar in Classical Rhetoric.
4 units, spring quarter (Gresseth) By arrangement

329. Seminar in British Public Address.
4 units, autumn quarter (Chapin) By arrangement

[Business and Professional Speaking.—See Business 301.]

INTERPRETATION OF LITERATURE

30. Fundamentals of Oral Reading I.—A basic course stressing the communication of thought and feeling from the printed page to others.
3 units, any quarter (Blattner, Loper) MWF 8, 9, 10, 1

130. Fundamentals of Oral Reading II.—A continuation of Speech and Drama 30, with emphasis on analysis and technique of various forms of poetry and prose. Prerequisite: Speech and Drama 30.
3 units, autumn, *winter, and *spring quarters (Blattner) MWF 8, 10

131. Interpretation of Literature.—Oral reading of poetry and prose, with emphasis on literary values which may be expressed in oral interpretation. Prerequisite: Speech and Drama 130, or consent of instructor.
3 units, autumn and *spring quarters (Blattner) MWF 11

230. Advanced Interpretation of Literature.—Program planning and the preparation of materials for public presentation. Prerequisite: Speech and Drama 131, or consent of instructor.
4 units, winter quarter (Blattner, Loper) TTh 2–4

238. The Art of Interpretation.—A consideration of theories on the art of interpretation.
4 units, autumn and *summer quarters (Blattner, Loper) TTh 2–4

239. Special Problems in Interpretation.—A detailed study of a selected subject dealing with some aspect of the field of interpretation.
3 units, spring quarter (Blattner, Loper) TTh 2–3:30

330. Seminar in Interpretation.—The material for study will vary from year to year; hence, the seminar may be repeated for credit.
4 units, winter and *summer quarters (Blattner, Loper) By arrangement

SPEECH SCIENCES, SPEECH CORRECTION, AND AUDIOLOGY

40. Speech Clinic.—Remedial work in speech defects, foreign accent, and hearing problems. Open to all students in need of corrective treatment.
No credit, any quarter (Anderson, Newby, and staff) By arrangement

47. English Communication for Foreign Students.—For the foreign students interested in improving their pronunciation and understanding of English speech and their use of the written language.
6 units, autumn quarter (Huntington and staff) MTWThF 4
(and one hour by arrangement)

48. English Communication for Foreign Students.—A continuation of Speech and Drama 47.
3 units, winter quarter (Huntington and staff) MW 4
(and one hour by arrangement)

49. English Communication for Foreign Students (Advanced).—Emphasis is placed upon fluency and ability to communicate effectively in both spoken and written English.
3 units, autumn quarter (Huntington and staff) TTh 3
(and one hour by arrangement)
3 units, winter quarter (Huntington and staff) TTh 4
(and one hour by arrangement)
3 units, spring quarter (Huntington and staff) MW 4
(and one hour by arrangement)

148. Principles of Phonetics.—English phonetics as applied to articulation, standards of pronunciation, the teaching of speech, and speech correction.
4 units, autumn quarter (Anderson) MTWF 9

149. Speech Re-education.—Fundamental training in the recognition and treatment of the more common types of vocal and articulatory defects.
4 units, autumn quarter (Anderson) MTWF 11

150. Introduction to Audiology: Hearing and Deafness.—Anatomy, physiology, and acoustics of hearing; survey of the field of audiology.
4 units, autumn quarter (Huntington) MWThF 1
4 units, *summer quarter (———) MTWThF 1

151. Basic Audiometry.—Theory and practice in administering individual and group hearing tests, with emphasis on public school audiometry.
3 units, winter quarter (Newby) MWF 10

153. Stuttering.—Theories of stuttering and modern approaches to therapy.
3 units, spring quarter (Anderson) [Not given in 1954–55]

242. The Psychology of Speech.—Origin and development of speech, semantics, relation of speech to thought, emotion, and personality.
4 units, spring quarter (Anderson) MTWF 1

243. Aphasia.—Historical survey, pathology, methods of testing and diagnosis, therapy.
2 units [Not given in 1954–55]

245. Introduction to Voice Science.—Studies in the physics and physiology of voice and speech; lectures, reports, and demonstrations.
4 units, winter quarter (Anderson) MTWF 1

247. Speech Problems in Cerebral Palsy.—Diagnosis and therapy for speech and language disturbances associated with cerebral palsy.
3 units, autumn quarter (———) MWF 10

250. Advanced Audiometry.—Pure tone and speech audiometric practices for the audiology clinic.
3 units, spring quarter (Newby) MWF 10
3 units, *summer quarter (Newby) MWThF 10

251. Aural Rehabilitation: Auditory Training and Speech.—Rehabilitative procedures for the hard of hearing child and adult. Supervised practical work in the clinic.
4 units, spring quarter (Newby) MWF 8 (and one hour by arrangement)
4 units, *summer quarter (Newby) MWThF 9 (and one hour by arrangement)

252. Speechreading.—Principles and methods of teaching the acoustically handicapped to utilize visual cues in communication. Supervised practical work in the clinic.
4 units, spring quarter (Newby) MWF 11 (and one hour by arrangement)

253. Speech Correction.—The classification, diagnosis, and treatment of speech defects. Supervised practical work in the speech clinic.
5 units, winter quarter (Anderson) MTWF 9 (and one hour by arrangement)

254. Medical Backgrounds of Speech Disorders.—Diagnosis and treatment of speech disorders having an organic basis.
4 units, winter quarter (Newby and staff) MF 11; W 4–6

255. Advanced Speech Correction.—Continuation of Speech and Drama 253 with emphasis upon the more serious types of speech disorders.
4 units, spring quarter (Anderson) MWF 9 (and one hour by arrangement)
4 units, *summer quarter (———) MTWF 11 (and one hour by arrangement)

256. Speech Correction for the Physically Handicapped.—Treatment of speech disorders related to physical handicaps.
4 units, winter quarter (Newby) [Not given in 1954–55]

257. Clinical Testing and Diagnosis.—Theory and practice in the use of tests and other diagnostic techniques that can be applied to speech correction.
2 units, winter quarter (Anderson) [Not given in 1954–55]

258. Clinical Practice in Speech.—Prerequisite: Speech and Drama 253. May be repeated for a total of 8 units.
1 or 2 units, any quarter (Staff) By arrangement

259. Clinical Methods.—Theory and practical demonstrations of materials and techniques applicable to speech and hearing therapy.
2 units, winter quarter (———) T 4–6

340. Proseminar in Speech Sciences.—An introduction to the various types of research and research methods in audiology, voice science, and speech correction. Required of all doctoral candidates specializing in speech sciences. Open to others by permission of instructor.
4 units, spring quarter (Huntington and staff) TTh 4–6

345. Seminar in Phonetics and Speech Silence.—The material for study will vary from year to year; hence, the seminar may be repeated for credit.
4 units, spring quarter (Anderson) By arrangement

350. Seminar in Hearing.
4 units, winter quarter (Newby) By arrangement
3 units, *summer quarter (Newby) By arrangement

353. Seminar in Speech Correction.—The material for study will vary from year to year; hence, the seminar may be repeated for credit.
4 units, autumn quarter (ANDERSON) By arrangement

THEATER AND DRAMA

60. Introduction to the Contemporary Theater.—The theater as a social institution, and the organization, operation, and personalities of the modern American stage.
3 units, winter quarter (PHILBRICK AND STAFF) MWF 9

61. Theory of Acting.—A study of the actor's resources, character and play analysis, and methods of acting.
3 units, autumn, *spring, and *summer quarters (STRICKLAND, LOPER) TTh 10; Lab. MWF 2-3

62. Fundamentals of Movement.—Bodily movement and basic pantomime for actors. Required of all students registered in acting courses.
2 units, autumn and *winter quarters (CROWDER) TTh 1-3

70. Elementary Make-Up.—A practical laboratory course in the fundamentals of make-up; required of all students concentrating in the field of theater and drama.
1 unit, any quarter (OPSVIG, ———) F 1-3

71. The Theory of Costume.—Lectures, laboratory, and demonstrations designed to acquaint the student with the theory of costuming a play, and with the elementary techniques of costume construction.
3 units, any quarter (OPSVIG, ———) Lec. TTh 11; Lab. TTh 1-4

72. The Technique of Costume.—A practical laboratory and shop course in the construction of costumes and costume accessories. Prerequisite: Speech and Drama 71.
2 units, any quarter (OPSVIG, ———) TTh 1-4

74. Elementary Stage Production.—The theory of and practice in the construction and painting of scenery, stage lighting, and stage management, including lectures, demonstrations, laboratory and crew work. Required of all undergraduate theater and drama students.
5 units, autumn and *spring quarters (BRUMMER, HARTIG) MWF 11; Lab. and crew by arrangement

75. Introduction to Stage Lighting.—Lectures, demonstrations, and assignments in practical stage lighting for department productions.
3 units, autumn and winter quarters (BRUMMER) TTh 11; Lab. and crew by arrangement

77. Intermediate Stage Production.—A continuation of Speech and Drama 74, with emphasis on scene construction, scene painting, and scenery manipulation on the stage.
3 units, autumn and *spring quarters (BRUMMER, HARTIG) MWF 9 and Lab. by arrangement

79. Introduction to Stage Design.—Elementary techniques of drafting, perspective, and water color for stage design.
3 units, autumn and *spring quarters (COLE, HARTIG) MWF 1

83. Puppetry.—Lectures and a practical laboratory, including construction and production practice of hand puppets for an adult theatre, for a children's theatre, and for speech therapy. This course may be repeated for credit with marionettes instead of hand puppets.
3 units, autumn and spring quarters (OPSVIG) Lec. MW 10; Lab. MW 1-3

85. Development of the Motion Picture.—Theatrical and cinematic method from Garrick to Milestone, including Griffith, Eisenstein, etc., and with laboratory and classroom showings of early and other significant films in a range of styles.
4 units, spring quarter (COLE) MWF 8; Lab. Th 7:15-9:30 P.M.

161. Technique of Acting.—A detailed study of stage practice, gesture, movement, timing and pointing, effective characterization. Prerequisites: Speech and Drama 30, 61, or 163.
3 units, winter and *summer quarters (STRICKLAND, LOPER)
TTh 10; Lab. MTWTh 2-3

163. Principles of Directing.—A study of the use of areas of the stage, arrangement of furniture for actors, picturization, balance, the use of levels, the psychology of actors, co-ordination of the playwright, electrician, designer, and actor. Practice and demonstration. Prerequisites: Speech and Drama 71, 74.
3 units, autumn and *spring quarters (STRICKLAND, PHILBRICK, LOPER)
TTh 11; Lab. MTWTh 2-3

170. Advanced Make-up.—Individual work in building of wigs, masks, and headdresses. Prerequisite: Speech and Drama 70, or equivalent.
3 units, autumn quarter (OPSVIG) MWF 9

171. History of Costume.—A historical survey of modes and manners from ancient times to the present day. Prerequisite: Speech and Drama 71.
3 units, winter and *summer quarters (OPSVIG) MWF 9

172. Introductory Costume Design.—The history of civil, military, ecclesiastical, and traditional costume for the stage. Prerequisite: Speech and Drama 171.
3 units, spring quarter (OPSVIG) MWF 9

174. Advanced Stage Production.—Intensive training in construction and painting of scenery, costume, stage lighting, and stage management, with emphasis on methods of instruction. Lectures, demonstrations, laboratory and crew work. Required of all graduate students in theater and drama who fail to demonstrate adequate previous training in this field.
5 units, winter and *summer quarters (COLE, BRUMMER, OPSVIG)
MWF 11; Lab. and crew by arrangement

176. Advanced Stage Lighting.—Colloquy and practice in the design and execution of the lighting plot. Controlboard operation. Prerequisites: Speech and Drama 74, 75, or 174.
3 units, autumn, *spring, and *summer quarters (BRUMMER) TTh 10

177. Advanced Technical Production.—Drafting for productions. Management of construction, stage, rigging crews. Stage management. Prerequisite: Speech and Drama 77.
3 units, autumn, *winter, and *summer quarters (BRUMMER, HARTIG)
MW 10; Lab. by arrangement

178. Techniques of Stage Design.—Lectures and laboratory in modern scene design. Work on paint crews for productions. Prerequisites: Speech and Drama 74, 79.
3 units, winter and *summer quarters (COLE) MWF 1; Lab. by arrangement

180. Children's Theater.—A course in the technique of conducting children's theaters, correlating social and dramatic aspects of play production.
2 or 3 units, summer quarter (———) [Not given in 1954-55]

181. Dramatization of Children's Literature.—A course in children's literature adapted to needs of nursery school teachers, as well as fundamentals of play adaptation for child actors and audience.
2 or 3 units, summer quarter (———) TTh 10; Lab. by arrangement
[Not given in 1954-55]

185. Technique of the Motion Picture.—Critical analysis of cinematic structure, with emphasis upon stylistic range and flexibility and upon pure cinema. Closed classroom film showings. May be taken for graduate credit by arrangement. Limited to twenty students.
4 units (———) [Not given in 1954-55]

190. Development of Dramatic Art (Ancient).—Development of the physical stage, the technical structure of the drama; and the types and forms of drama from the origins in Greece to the end of the medieval period.
4 units, autumn quarter (HEFFNER, PHILBRICK) MTWF 8

191. Development of Dramatic Art (Modern).—History and development of the drama and the theater from the medieval period to modern times.
4 units, winter quarter (HEFFNER, PHILBRICK) MTWF 8

192. Development of Dramatic Art (Modern).—History and development of the modern theater and drama from approximately the time of Ibsen to the present.
4 units, spring quarter (HEFFNER, PHILBRICK) MTWF 8

261. Rehearsal and Performance.—Each quarter is devoted to the methods of acting a particular type of drama or opera. Prerequisites: Speech and Drama 30, 61, 101, 161, and permission of instructor. May be repeated for a total of 9 units.
3 units, any quarter (STRICKLAND, PHILBRICK, LOPER) TWTh 4–5

263. Advanced Directing.—Interpreting the play, plotting the action, methods of achieving a climax, handling of group and mob scenes. Demonstration and practice. Prerequisite: Speech and Drama 163.
3 units, winter and *summer quarters (STRICKLAND, PHILBRICK, LOPER)
TTh 11; Lab. TTh 3–4

264. Projects in Directing.—Problems in theory involving an examination of the various historic and modern styles of drama. Prerequisite: Speech and Drama 263, or equivalent. This course may be repeated for a total of 9 units. By permission of instructor.
3 units, any quarter (STRICKLAND, PHILBRICK, LOPER) M 3–5; W 4–5

272. Projects in Stage Costume.—Individual work in the designing and creating of costumes and accessories for various productions. Prerequisite: Speech and Drama 172. By permission of instructor.
3 to 5 units, any quarter (OPSVIG) TTh 10

276. Projects in Stage Lighting.—Advanced work in styles of production or special lighting and model projects. Designing for productions. Prerequisites: Speech and Drama 176 and 178.
3 units, winter, *spring, and *summer quarters (BRUMMER)
TTh 9; Lab. by arrangement

277. Projects in Technical Production.—Advanced work involving technical direction and stage management of department productions. Theater and house management. Prerequisites: Speech and Drama 74 and 77 or 174 and 177.
3 units, winter, *spring, and *summer quarters (COLE, BRUMMER)
MW 9; Lab. and crew by arrangement

278. Projects in Stage Design.—Advanced work in styles of production, or special design and model projects. Prerequisites: Speech and Drama 176, 178. By permission of instructor.
3 units, autumn, *spring, and *summer quarters (COLE) MW 10

282. Advanced Children's Theater.—A laboratory and conference course offering practical experience in operating a children's theater. Prerequisite: Speech and Drama 180.
3 units, summer quarter (———) [Not given in 1954–55]

285. Stage and Screen.—Critical analysis and comparison of cinematic and dramatic structure for the student interested in writing or directing for the stage or screen. Closed classroom film showings. Limited to fifteen students.
4 units [Not given in 1954–55]

291. American Drama.—A survey of the history of the theater and of the dramatic literature of America from Colonial days to the Civil War. (Listed also as English 291.)
4 units, winter quarter (HEFFNER, PHILBRICK, COLE) MTWF 10

292. Modern American Drama.—A course in the American theater and its drama from the Civil War to the present day. (Listed also as English 292.)
4 units, spring quarter (HEFFNER, PHILBRICK, COLE) MTWF 10

294. Playwriting and Dramatic Structure.—Critical analysis of dramatic structure and technique for the student interested in dramatic literature, play directing, or the writing of original plays. The course may be taken for graduate credit in speech and drama. (Listed also as English 294.)
4 units, autumn quarter (HEFFNER, PHILBRICK) MTWF 9

295. Playwriting.—This course is a continuation of Course 294 but is open only to students who have shown distinctive abilities as writers in 294. (Listed also as English 295.)
4 units, winter quarter (HEFFNER, PHILBRICK) MTWF 9

296. Advanced Playwriting.—Special projects in dramatic composition. Students may register for this course only with the consent of the instructor. The course may be taken for graduate credit in speech and drama. (Listed also as English 296.)
4 units, spring quarter (HEFFNER, PHILBRICK) MTWF 9

297. Theaters and Staging I (Classical).—Survey of theaters, staging methods, and scenic design in relation to social and dramatic values and to styles of theatrical production, from the Greeks through the Neo-Classical.
4 units, autumn quarter (COLE) TTh 4–6

298. Theaters and Staging II (Modern).—Survey of theaters, staging methods, and scenic design in relation to social and dramatic values and to styles of theatrical production, from the Neo-Classical to Modern.
4 units, winter quarter (COLE) TTh 4–6

360. Proseminar in Theater and Drama.—An introduction to the various types of research and research methods in theater and the drama. Required of graduate students specializing in theater and drama.
4 units, winter and *summer quarters (HEFFNER, PHILBRICK, COLE) MW 3–5

390. Seminar in Theatrical History and Dramatic Literature.—The material for study will vary from year to year; hence, the seminar may be repeated for credit.
4 units, summer quarter (HEFFNER, PHILBRICK) [Not given in 1954–55]

391. Seminar in Comedy.—A study of comedy as a dramatic form, with emphasis on trends in American comedy.
4 units, autumn quarter (PHILBRICK) MW 3–5

392. Seminar in Melodrama.—A study of melodrama as a form of drama, from its origins to the present day cinema versions, including some attention to other types of popular theatrical entertainment.
4 units, summer quarter (HEFFNER) [Not given in 1954–55]

393. Seminar in Contemporary Drama.—The major emphasis in this seminar is on the development of modern realism, with attention also to naturalism and expressionism as these affected contemporary drama.
4 units (HEFFNER) [Not given in 1954–55]

394. Seminar in Dramatic Structure.—An intensive study of Aristotle's *Poetics* and selected dramatic criticism as a basis of analysis of dramatic structure.
4 units, spring quarter (HEFFNER) MW 4–6

396. Projects in Playwriting.—A seminar in the composition of the full length play. Open to students who have completed advanced playwriting, or its equivalent, or who have through submission of original plays demonstrated an aptitude for advanced technical qualifications in playwriting. Admission by consent of instructor. The course may be repeated for a total of 9 units. (Listed also as English 396.)
4 units, winter, *spring, and *summer quarters (HEFFNER, PHILBRICK) By arrangement

397. Seminar in Stage Arts and Techniques.—Reading and research in various fields of technique and art of theatrical production. Limited to ten students.
4 units, spring quarter (COLE) By arrangement

STATISTICS

Albert Hosmer Bowker (Executive), Professor of Statistics and Mathematics
Meyer Abraham Girshick, Professor
Kenneth J. Arrow, Professor of Economics and Statistics
Quinn McNemar, Professor of Psychology, Education, and Statistics
Herman Chernoff, **Charles Stein**, Associate Professors
Lincoln E. Moses, **Herman Rubin**, Assistant Professors
Gerald J. Lieberman, Assistant Professor of Statistics and Industrial Engineering

In addition to the courses offered in this department, instruction in statistics is offered in several other departments of the University in which statistical methods are used in research and in the Department of Mathematics. Courses in other departments which may be used to satisfy the requirements for a degree in statistics are included in the lists in Groups A, B, and C below.

Requirements for Graduation.—Candidates for graduation with statistics as their major subject must complete 50 units of courses in statistics as follows:

1. Statistics 50, or equivalent
2. Economics 170
3. Mathematics 43 (or 22 and 23) and 24, or 63 and 64
4. Statistics 116, 118, 120, 112
5. Additional units to complete the 50 must be chosen from either Group A, B, or C below.

Students should work out a program including a series of courses in a field in which statistical methods may be applied.

Advanced Degrees.—Properly qualified students may undertake programs leading to the degree of Master of Science in statistics. Candidates will be expected to complete the equivalent of 45 units of work in the University, of which 30 must be among those listed below. This work will include a thesis. A special program is offered for students with a Bachelor's degree in engineering or science who are interested in industrial statistics.

Candidates for the degree of Doctor of Philosophy in statistics will follow such courses as are approved by the department faculty, subject to general University regulations. Each student's program should be arranged to include work in pure mathematics, mathematical statistics, and the application of statistics to some particular field. In preparation for research, students will be encouraged to include as much pure mathematics as possible in their studies. Work in a field of application should be stressed in the case of students who have concentrated heavily on mathematics as undergraduates.

The relative amount of time allotted to study under each of these headings will vary from individual to individual, according to previous training and experience. In any case, the following requirements are stipulated:

1. Familiarity with the mathematical theory of probability and the major divisions of statistical theory. Ordinarily, students will take Statistics 220, 224*a*, 224*b*, 224*c*, 228*a*, 228*b*, 230*a*, 230*b*, 230*c*, 236*a*, 236*b*, 236*c*.
2. Satisfactory completion of Mathematics 205*a*, 205*b*, 205*c*, and 206*a*, or equivalent.
3. Completion of a satisfactory minor in a field outside the jurisdiction of this department.
4. A six-hour written examination in statistics.

Minor for the Degree of Doctor of Philosophy.—The general requirements for the minor in statistics are a reasonable knowledge of the principal branches of the theory of statistics and professional competence in those branches of statistical theory commonly applied in the major. The degree of proficiency ordinarily required is that which an able graduate student might be expected to acquire in 30 hours of graduate work in statistics, its applications, and relevant mathematics. Ordinarily, about one-third of the minor will be in areas directly related to the major, one-third will consist of the basic sequence in mathematical statistics (Statistics 116, 118, and 120), and the remainder may be chosen from courses in Groups A, B, and C below, subject to the approval of the department. In some cases, courses in mathematics will be allowed as part of the program of study normally required for the minor.

Group A. Courses in Statistical Techniques:

Advanced Statistical Methods (Psychology 150*a*, 150*b*, and 250)
Sampling from Human Populations (Statistics 108)
Advanced Experimental Methods (Statistics 112)
Statistical Laboratory (Statistics 210)

Group B. Courses in Mathematical Statistics:

Theory of Probability (Statistics 116)
Regression Analysis (Statistics 118)
Statistical Inference (Statistics 120)
Analysis of Variance (Statistics 122)
Sequential and Non-Parametric Tests (Statistics 124)
Statistical Analysis (Economics 270 and 271)
Estimation and Testing Hypotheses (Statistics 220)
Experimental Statistics (Statistics 214)
Multivariate Analysis (Statistics 224*a*, 224*b*, and 224*c*)
Colloquium in Statistics (Statistics 226)
Non-Parametric Statistical Inference (Statistics 228*a* and 228*b*)
Advanced Probability (Statistics 230*a*, 230*b*, and 230*c*)
Time Series Analysis (Statistics 234)
Theory of Games and Statistical Decisions (Statistics 236*a*, 236*b*, and 236*c*)
Advanced Decision Theory (Statistics 238*a*, 238*b*, and 238*c*)
Stochastic Processes (Statistics 242*a* and 242*b*)

Group C. Courses which involve application of statistical theory to the subject matter indicated:

Business Forecasting (Graduate School of Business 232)
Interpretation of Business Data (Graduate School of Business 331)
Marketing Research (Graduate School of Business 348)
Engineering Diagrams (Civil Engineering 218)
Quality Control by Statistical Methods (Industrial Engineering 120)
Quality Control Applications (Industrial Engineering 220)
National Economic Accounting (Economics 171)
Quantitative Analysis in Economics (Economics 272)
Statistical Methods in Engineering and the Physical Sciences (Statistics 110)
Sampling Inspection (Statistics 216)
Special Topics in Mathematical Economics (Economics 205)
Quantitative Methods in Biology (Biology 189)
Introduction to Operations Research (Industrial Engineering 252)

Fellowships and Assistantships.—Besides the University fellowships open to all graduate students, several assistantships involving teaching or research are available in the department. The stipend for teaching assistantships is $400 per quarter and appointments may be made for one or more quarters for the academic year. In addition, the Applied Mathematics and Statistics Laboratory offers research assistantships with salaries of $100 to $200 a month. One University Honors Fellowship with a stipend of $1,800 a year has been earmarked for the department. Applications for University fellowships should be made to the Dean of the Graduate Division; applications for teaching and research assistantships should be made to the Executive Head of the department.

COURSES OF INSTRUCTION

50. Statistics.—An introductory course in statistics designed for students in the social and natural sciences. Emphasis will be on the modern principles of statistical inference. Prerequisite: Mathematics A.

5 units, autumn quarter (Girshick) MTWThF 11
5 units, *spring quarter (Moses) MTWThF 1

108. Sampling from Human Populations.—Theory of sampling from finite populations; efficiency of various survey designs; applications.

4 units, spring quarter (———)

110. Statistical Methods in Engineering and the Physical Sciences.—The course is devoted to the use of statistical methods in research and production. The topics include a treatment of measurement errors, comparison of two or more means, linear calibration, correlation, and the design of engineering experiments.

4 units, autumn quarter (Lieberman) MW 4 and TTh 10
4 units, *spring quarter (Lieberman) MTWF 10

112. Advanced Experimental Methods.—Randomization basis of experimental inference; randomized blocks; Latin squares; factorial experiments; split blocks; confounding and fractional replication; special topics.

3 units, winter quarter (Moses)

116. Theory of Probability.—Elementary probability theory, sampling, distributions. Prerequisite: a working knowledge of calculus. (Same as Mathematics 123 and Economics 270.)

4 units, autumn quarter (Chernoff) MTWF 9

118. Regression Analysis.—Statistical inference, regression analysis. Prerequisite: Statistics 116. (Listed also as Economics 271.)

5 units, winter quarter (Arrow) MTWThF 3

120. Statistical Inference.—Point estimation; the theory of testing simple hypotheses; interval estimation; applications to the normal, binomial, and Poisson distributions; principles of sequential analysis for simple hypotheses. Procedures for dealing with composite hypotheses: applications to the "t" test and analysis of variance; various hypotheses associated with the bivariate normal distribution.

3 units, spring quarter (Bowker)

122. Analysis of Variance.—Theory of the general linear hypotheses; important special cases of the analysis of variance; the case of unequal class frequencies.

3 units, autumn quarter (Moses)

124. Sequential and Non-Parametric Tests.—The sequential method of statistical decisions; probability ratio tests; the fundamental identity; simple hypotheses; composite hypotheses; rank order statistics; tests based on permutations of observations; non-parametric tolerance intervals.

3 units, winter quarter (Bowker)

210. Statistical Laboratory.—This course is designed to train students in the planning of a statistical inquiry, and analysis of the results. Under the direction of a faculty member, students will carry out a research project in applied statistics. Required of all graduate students.

2 to 5 units, any quarter (Department Staff)

214. Experimental Statistics.—This course is a continuation of Statistics 110. Multivariate normal distribution; multiple correlation and regression; estimation and tests of hypotheses about regression coefficients; analysis of variance; selected topics. Prerequisite: Statistics 110.

3 units, winter quarter (Lieberman)

216. Sampling Inspection.—Review of principles of lot-by-lot acceptance inspection; variables inspection; general principles of sequential sampling plans; sampling plans for continuous production which control average outgoing quality. Prerequisite: Statistics 110.
3 units, spring quarter (BOWKER)

220a. Estimation and Testing Hypotheses.—Review of point estimation; properties of maximum likelihood estimates; interval estimation; Neyman-Pearson theory of testing hypotheses; the minimax approach to statistical inference; sequential method of estimation and testing hypotheses.
3 units, autumn quarter (STEIN)

220b. Estimation and Testing Hypotheses.—Continuation of Course *220a*.
3 units, winter quarter (STEIN)

224a. Multivariate Analysis.—Likelihood ratio tests for hypotheses involving the multivariate normal distribution. Derivation of generalized T^2 and Wishart distribution. Factor analysis and relation between sets of variates.
3 units, autumn quarter (STEIN) [Not given in 1954–55]

224b. Multivariate Analysis.—Continuation of Course *224a*.
3 units, winter quarter (STEIN) [Not given in 1954–55]

224c. Multivariate Analysis.—Continuation of Course *224b*.
3 units, spring quarter (STEIN) [Not given in 1954–55]

226. Colloquium in Statistics.—Reports on current literature with discussion and presentations by graduate students and faculty interested in statistics, with emphasis on the theory of games and statistical decisions.
2 to 5 units, any quarter (DEPARTMENT STAFF)

228a. Non-Parametric Statistical Inference.—Statistical inference when the functional form of the underlying distribution is unknown; rank order statistics; sign tests; non-parametric discriminant analysis; non-parametric tolerance limits; theory of runs.
3 units, winter quarter (STEIN)

228b. Non-Parametric Statistical Inference.—Continuation of Course *228a*.
3 units, spring quarter (STEIN)

230a. Advanced Probability.—Selected topics in measure theory; conditional expectation; sufficient statistics. Prerequisite: Mathematics *205c*, or equivalent.
3 units, autumn quarter (CHERNOFF)

230b. Advanced Probability.—Continuation of Course *230a*.
3 units, winter quarter (CHERNOFF)

230c. Advanced Probability.—Continuation of Course *230b*.
3 units, spring quarter (CHERNOFF)

234. Time Series Analysis.—Analysis of time series, including serial correlation and methods of estimation in multivariate time series.
3 units, autumn quarter (ARROW) [Not given in 1954–55]

236a. Theory of Games and Statistical Decisions.—Theory of finite and continuous games; theory of statistical decisions with applications to sequential and fixed sample size testing and estimation problems. Prerequisite: Mathematics 115.
5 units, autumn quarter (GIRSHICK)

236b. Theory of Games and Statistical Decisions.—Continuation of Course *236a*.
5 units, winter quarter (GIRSHICK)

236c. Theory of Games and Statistical Decisions.—Continuation of Course *236b*.
5 units, spring quarter (GIRSHICK)

238a. Advanced Decision Theory.—Treatment of statistical decision problems under conditions more general than those in Statistics 236. Prerequisites: Statistics 236*c* and Mathematics 205*c*.
3 units, autumn quarter (RUBIN) [Not given in 1954–55]

238b. Advanced Decision Theory.—Continuation of Course 238*a*.
3 units, winter quarter (RUBIN) [Not given in 1954–55]

238c. Advanced Decision Theory.—Continuation of Course 238*b*.
3 units, spring quarter (RUBIN) [Not given in 1954–55]

240. Thesis.—Research undertaken in connection with a Master's thesis or a Doctor's dissertation.
(DEPARTMENT FACULTY)

242a. Stochastic Processes.—Fundamental notions of stochastic processes; discrete processes; continuous processes; Markoff processes; differential processes; Gaussian processes; applications to statistics and physics. Prerequisite: Statistics 230*a*, or equivalent.
3 units, winter quarter (RUBIN)

242b. Stochastic Processes.—Continuation of Course 242*a*. Prerequisites: Statistics 242*a*.
3 units, spring quarter (RUBIN)

SCHOOL OF LAW

JOSEPH WALTER BINGHAM, MARION RICE KIRKWOOD, WILLIAM BROWNLEE OWENS, Professors Emeriti

CARL BERNHARDT SPAETH (Dean), JAMES EMMETT BRENNER, MOFFATT HANCOCK, JOHN BINGHAM HURLBUT, JOHN R. MCDONOUGH, JR., STANLEY MORRISON, PHIL C. NEAL, GEORGE EDWARD OSBORNE, HARRY JOHN RATHBUN, HAROLD SHEPHERD, SAMUEL D. THURMAN, LOWELL TURRENTINE, Professors

HOMER G. ANGELO, Acting Professor

RICHARD A. FRANK, J. KEITH MANN, GORDON KENDALL SCOTT, Associate Professors

PRESTON N. SILBAUGH (Assistant Dean), JOHN COLEMAN LEARY (Librarian), JOHN HENRY MERRYMAN, HARRY WELLINGTON, Assistant Professors

WAYNE D. HUDSON, Acting Assistant Professor

WILLIS D. HANNAWALT, Teaching Fellow

CHARLES ALEXANDER BEARDSLEY, HENRIE GRANVILLE HILL, LEONARD SAXTON LYON, JR., Lecturers

FRANK B. BELCHER, MARSDEN S. BLOIS, WALTER E. BRUNS, FRANK V. CAMPBELL, WALLACE CATHCART, HERBERT W. CLARK, EUSTACE CULLINAN, ROLAND C. DAVIS, MILTON W. DOBRZENSKY, L. POLK DODSON, JR., MAURICE T. DOOLING, JR., C. J. GOODELL, HERBERT L. HAHN, EDWARD E. HARDY, GEORGE M. HENZIE, MARIAN A. JONES, EDWARD D. LANDELS, EVERETT S. LAYMAN, BERT W. LEVIT, ROBERT M. C. LITTLER, FRANCIS PRICE, FRANCIS PRICE, JR., JOSEPH D. SULLIVAN, STANLEY A. WEIGEL, Lecturers in Law Office Practice

ORGANIZATION

The School of Law was established, as a department of the University, in 1893. Its purpose is to provide a thorough legal education for students who are fitted by their maturity and their previous academic training to pursue professional study under university methods of instruction. The curriculum leading to the first degree in law (LL.B.) constitutes an adequate preparation for the practice of law in any English-speaking jurisdiction. In all courses some special attention is paid to problems of local law in the Western states. Graduate work leading to the degrees of Master of Laws and Doctor of the Science of Law is also offered. The academic year consists of four quarters of equal length.

THE LIBRARY

The Law Library, including the holdings of Crothers Hall, contains over 81,000 volumes, including complete sets of English, Irish, Scotch, Australian, New Zealand, and Canadian reports, reports of all federal courts of the United States, and of the courts of the various states, the Australian states, and the Canadian provinces, the National Reporter system, the standard collections of cases, the standard English and American legal encyclopedias, the principal American, English, and Canadian digests and citators, sets of the leading American, British, Canadian, and Continental legal periodicals, together with a good collection of textbooks. There is also a somewhat complete collection of compiled laws, session laws, and other statutory material, both federal and state, as well as British, Canadian, and Australian.

The Class of 1911, upon graduation, adopted a plan for the purchase, from time to time, of works on legal history. This collection is known as the "Class of 1911 Memorial Collection on Legal History."

Through the efforts of the Stanford Law Association a fund was established in 1923 in memory of Charles Andrews Huston, who was for many years Professor of Law and Dean of this School. The income from this fund is to be used for the purchase of books for the Law Library.

Through the generosity of Justice T. B. McFarland, Justice H. A. Melvin, Justice W. A. Sloane, Justice Frank H. Kerrigan, Justice John E. Richards, Justice Ira F. Thompson, Justice Frederick W. Houser, and Justice B. Rey Schauer, the Library has received, since 1907, a set of the records of the California Supreme Court, and through the generosity of Justice M. C. Sloss, Justice Warren Olney, Jr., Justice C. A. Shurtleff, Justice Frank H. Kerrigan, Justice John E. Richards, Justice Ira F. Thompson, Justice Frederick W. Houser, and Justice B. Rey Schauer, a set of the records of the District Courts of Appeal. In 1950 Judge Louis E. Goodman, of the Federal District Court in San Francisco, made possible the purchase of books and equipment for the library beyond what would otherwise have been possible under the regular library budget. Judge Goodman has generously undertaken to make a similar gift each year for several years to come, and these funds are being used to purchase microcard and microfilm readers and legal materials available on card or film, which are in their original form extremely rare and too expensive to acquire.

The University Libraries are also available for use by students of the School of Law.

THE COMBINED SIX-YEAR ACADEMIC AND PROFESSIONAL PROGRAM

The School of Law offers a program of study leading to both the degree of Bachelor of Arts and the degree of Bachelor of Laws based upon six years (of three quarters each) of college study. The six-year program consists of nine quarters of academic study and nine quarters of professional study. Under this program, students with at least 135 quarter units of credit in undergraduate academic study are admitted to the School of Law to devote the next nine quarters exclusively to professional law study. Undergraduate students who meet the requirements of the University and who successfully complete the first-year professional law courses will be recommended for the Bachelor of Arts degree in the pre-legal curriculum. The Bachelor of Laws degree can be earned in six quarters thereafter.

ADMISSION TO THE SCHOOL OF LAW

Students with at least 135 quarter units of academic credit (which is the normal achievement in three academic years of college work) and whose records are of satisfactory quality may be admitted as first-year law students to take a full law program.

It is advised that the matter of admission be settled in advance. It is particularly important that students studying in institutions other than Stanford make inquiry as early as January of the year in which they desire to enter, for the purpose of determining their eligibility. All applicants are required to take a Law School Admission Test, information concerning which may be had by writing directly to the Law School. The necessary application blanks and any further information as to admission will be furnished upon request.

BACHELOR OF ARTS

The degree of Bachelor of Arts in the pre-legal curriculum is conferred upon recommendation of the faculty of the School of Law and the Committee on Graduation on undergraduate students who meet the requirements of the University for that degree and who successfully complete the first-year courses in law.

BACHELOR OF LAWS

The degree of Bachelor of Laws (LL.B.) is conferred upon recommendation of the faculty of the School of Law and the Committee on Graduate Study on students who have received the degree of Bachelor of Arts, or its equivalent, from this University or from some other institution of recognized collegiate rank, and who have satisfactorily completed courses in law aggregating 124 quarter units after devoting not less than nine full quarters thereto, and who otherwise have satisfied the requirements of the University and of the School of Law.

MASTER OF LAWS

Admission to candidacy for the degree of Master of Laws (LL.M.) is granted only to students who are eligible for admission to the School of Law in regular standing and who have completed, with grades acceptable to this faculty, the work for the first degree in law at this University, or at some other university law school of recognized standing in which the work for the first degree in law covers a period of not less than six years of combined academic and law study, and who otherwise satisfy the requirements of the University and of the School of Law.

The degree of Master of Laws is conferred upon students so admitted to candidacy upon the completion, with distinction, of one year (39 units) of work in this School in accordance with the rules of the University and of the School of Law. Upon his admission to candidacy, each student must present for the approval of the faculty the program which he wishes to pursue for this degree. The major portion of such program shall be in law and shall include not less than six units of independent research devoted to the preparation of an acceptable thesis.

DOCTOR OF THE SCIENCE OF LAW

Admission to candidacy for the degree of Doctor of the Science of Law (J.S.D.) is granted only to those who have received the degree of Master of Laws at this University, and who have completed the work required for such Master's degree with marked excellence and have given clear proof of ability to do legal research of high quality.

The degree of Doctor of the Science of Law is conferred upon applicants so admitted to candidacy who spend one full academic year in independent legal research and as a result thereof present a thesis which is, in the opinion of the faculty of the School of Law, a contribution to knowledge. Such work and thesis shall conform to the rules and regulations of the University and of the School of Law.

SUMMER QUARTER

By taking advantage of the four-quarter system, with its opportunities for summer instruction, the three-year law curriculum may be completed in two years and three months. Announcement of courses to be offered during the summer quarter of 1955 will be made during the autumn of 1954.

CURRICULUM

[NOTE.—As it may occasionally become necessary to change the regulations and courses outlined herein, the right is reserved to make such changes.]

NONPROFESSIONAL COURSES

[Credit in nonprofessional courses may be counted toward the A.B. degree, but not toward professional degrees in law.]

101. Business Law I.—An elementary course dealing with the Anglo-American legal system, and the law of contracts and quasi-contracts, primarily for students who do not intend to become lawyers. Open to Upper Division and graduate students. Teevan and Smith, *Business Law,* Vol. I.
5 units, autumn quarter, 3 sections (RATHBUN, FRANK)
5 units, *winter quarter, 1 section (FRANK)

102. Business Law II.—An elementary course in the law of bailments, sales, negotiable instruments and agency for students who do not intend to enter law as a profession. Prerequisite: Business Law I. Textbooks: Teevan and Smith, *Business Law,* Vols. I and II.
5 units, winter quarter (RATHBUN)
5 units, *spring quarter (FRANK)

Law Problems in Business.—(See *Announcement of the Graduate School of Business* for legal studies conducted by Mr. Rathbun and Mr. Frank in that school.)

PROFESSIONAL COURSES

FIRST-YEAR COURSES

[All of the first-year courses are required for the LL.B. degree.]

201. Personal Property and Equity.—Concepts of property, possession; finding; bailment acquisition of ownership: adverse possession; bona fide purchase; accession, confusion; satisfaction of judgment; liens; pledges; conversion. An introductory study of the origin and nature of equity jurisdiction; inadequacy of the legal remedy as a basis for the exercise of equitable powers; equitable jurisdiction over torts. (Personal Property casebook to be announced.) Cook, *Cases on Equity* (3d ed.), one volume.
4 units, autumn quarter; 2 units, winter quarter (OSBORNE)

202. Contracts.—Formation of simple contracts; the consideration requirement at law and in equity; contracts for benefit of third parties; writings, including Statute of Frauds, parol evidence rule, and the sealed instrument concept; assignments; joint obligations; illegality; discharge of contracts. Shepherd, *Cases on Contracts and Contract Remedies* (3d ed.).
3 units, autumn quarter; 3 units, winter quarter; 3 units, spring quarter (SHEPHERD)

203. Torts.—Principles of tort liability as developed in the action of trespass; justification and excuse; negligence as a basis of liability; common law and statutory duties of care; legal cause, contributory negligence; damages; absolute liability; nuisance; deceit; defamation; malicious prosecution; right of privacy. Smith & Prosser, *Cases and Materials on Torts.*
3 units, autumn quarter; 3 units, winter quarter; 2 units, spring quarter (THURMAN)

204. Criminal Law.—Nature, purposes, and sources of criminal law; the elements of and circumstances affecting liability; general survey of procedure from arrest to appeal; selected law enforcement problems. (Study material to be announced.)
4 units, spring quarter (HURLBUT) [Not given in 1954–55]

206. Real Property.—Tenure; estates in land with reference to quantity, absolute and qualified character, time of enjoyment, number and connection

of owners, creation and transfer, uses, marital interests. Acquisition of title by adverse possession and prescription. Casner and Leach, *Cases and Text on Real Property*.
2 units, winter quarter; 3 units, spring quarter (HANCOCK)

207. Agency.—Creation and characteristics of the principal-agent relationship. Agent's power to create for his principal contractual rights and liabilities, and liability in tort. Undisclosed principal; ratification of unauthorized acts; termination of agency; liability of agent. Steffen, *Cases on Agency* (2d ed.).
2 units, winter quarter; 2 units, spring quarter (NEAL)

208. Legal Bibliography and Research.—A series of lectures and exercises dealing with the nature and use of law books and legal research methods. *California Legal Materials* (mimeographed).
No units, autumn quarter (LEARY)

209. Civil Procedure.—This course is designed to acquaint the first-year student with the role of procedure and the fundamentals of procedure in civil litigation from the commencement of an action through appeal. Historical background is not ignored but emphasis is given to procedure under modern legislation and rules of court, including the Federal Rules of Civil Procedure. Judicial organization in the United States; actions in the federal courts and the relationship between state and federal courts; the relationship between procedural and substantive law; the evolution of modern procedure; jurisdiction and venue; provisional remedies; pleading; clarifying the issues including discovery and pretrial procedures; burden of proof and presumptions; the trial of an action; jury trial and the role of the judge in jury trial; verdict and motions after verdict; judgments and their enforcement; appellate review. Scott and Simpson, *Cases and Materials on Civil Procedure*; mimeographed material.
3 units, autumn, winter, and spring quarters (HURLBUT)

REQUIRED SECOND-YEAR COURSES

223. Legal Writing.—A course designed to improve research and analytical techniques and to provide training in effective written expression. Research problems are selected from different substantive fields and require consideration of procedural and evidentiary material as well as precise characterization and analysis of issue. Intensive criticism is given to substance, organization, and style of office memoranda and briefs prepared by students. Instruction by teaching fellows in personal interviews and conferences.
1 unit, autumn, winter, and spring quarters (total of 3 units required)

227. Commercial Law I.—The concept of negotiability; the Negotiable Instruments Law; commercial paper and its uses; checks and check collection; problems caused by forgery. (Study material to be announced.)
4 units, spring quarter (WELLINGTON)

233. Private Corporations.—Statutory methods of creating corporations; defectively formed corporations; preincorporation transactions by promoters; by whom and how corporations act; scope of corporate activities; directors' duties, and remedies for their enforcement; creation, maintenance, decrease, and increase of corporate capital. Dodd and Baker, *Cases and Materials on Corporations* (2d ed.).
2 units, winter quarter; 4 units, spring quarter (SCOTT)

240. Conveyances.—Methods of conveying interests in land at common law, under the statute of uses and in the United States; formal requirements, writing, signature, seal, delivery, acceptance; description of the land conveyed; nature, creation, and termination of incorporeal interest—rents, profits, easements, licenses; covenants and agreements running with the land at law and in

equity including covenants for use and covenants for title; estoppel by deed; recording and title registration. (Study material to be announced.)
3 units, autumn quarter; 2 units, winter quarter (HANCOCK)

246. Contract Remedies.—Condition and promise distinguished; the role of conditions at law and in equity; breach and anticipatory breach of contract; the action for damages and rules for determining measure of damages; the action for specific performance including mutuality and the doctrine of equitable conversion; the remedy of restitution in transactions associated with contract. Shepherd, *Cases on Contracts and Contract Remedies* (3d ed.), and mimeographed materials.
3 units, autumn and winter quarters (SHEPHERD)

247. Trusts.—The Anglo-American system of uses and trusts. Nature of a trust; other sorts of interest and relations distinguished; the creation, transfer, and extinguishment of trust interests, express, resulting, and constructive; validity of trusts; effect of statutes; charitable trusts; priorities and relative validity of competing equities; importance of the legal title to the one claiming adversely to a trust property; duties of the trustee. Scott, *Cases on Trusts* (4th ed.).
3 units, autumn quarter; 3 units, winter quarter (OSBORNE)

250. Code Pleading.—The civil action; splitting and joining actions; the complaint, including the caption, the statement of facts, and the prayer for relief; the answer, including general and specific denials, affirmative defenses and counterclaims; the demurrer; the reply; motions; bills of particulars; amendment and aider; construction of pleadings. (Study material to be announced.)
4 units, autumn quarter (McDONOUGH)

271. Constitutional Law.—The judicial function in constitutional cases. Separation of powers. The federal system. Powers delegated to the national government: the power to regulate interstate and foreign commerce; the power to tax; the power to dispose of property belonging to the United States; the power to make treaties; military powers, etc. Powers of the state as affected by the delegation of powers to the national government, particularly the commerce clause. Limitation on the powers of government; the due-process clauses; the contract clause; the equal-protection clause; the clauses relating to the privileges and immunities of citizens. Dowling, *Cases on Constitutional Law* (4th ed.), and selected cases.
3 units, winter quarter; 4 units, spring quarter (MORRISON)

OTHER SECOND- AND THIRD-YEAR COURSES

[Evidence, Taxation, and one seminar course are required for the LL.B. degree.]

224. The Legal Profession.—Two subjects: first, the history and present organization of the legal profession, including the purposes and work of the American Bar Association, the National Lawyers Guild, and the State Bar of California; second, the problems of professional usage and ethics commonly encountered in practice. (Casebook to be announced.)
1 unit, winter quarter (TURRENTINE)

228. Commercial Law II.—The sale of goods—the passage of title and its consequences; security and financing devices used in commercial transactions: conditional sale, chattel mortgage, trust receipt, consignment, field warehousing, factors' lien, assignment of accounts receivable. Some problems in insurance of goods. Prerequisite: Commercial Law I (Course 227). (Study material to be announced.)
4 units, winter quarter (WELLINGTON)

230. Security.—The nature of a mortgage; equitable mortgages, restrictions upon the right to redeem; obligations which may be secured by a mortgage; general principles governing priorities; including mechanics' liens and con-

ditional sales or chattel mortgages of fixtures; transfer of a mortgagee's interest; transfer of a mortgagor's interest; discharge of a mortgage; redemption from a mortgage; subrogation, contribution, and exoneration—marshaling assets; basic principles of suretyship. Osborne, *Cases on Property Security* (2d ed.).
4 units, spring quarter (OSBORNE)

231. **Creditors' Rights.**—Remedies available to a creditor to collect judgment: execution, attachment, garnishment, judgment liens, creditors' bills, supplementary proceedings, relief against fraudulent conveyances. Liquidation: general assignments and bankruptcy. Debtor relief: exemption and homestead laws, composition, discharge in bankruptcy. Hanna and McLachlan, *Cases on Creditors' Rights* (4th ed.). Volume I.
4 units, autumn quarter (WELLINGTON)

232. **Accounting.**—A series of lectures on elementary accounting principles and techniques and an introduction to the interpretation of financial statements.
No units, winter quarter (SCOTT)

233a. **Corporate Reorganization and Finance.**—Seminar. Corporate reorganization under Chapter X of the Bankruptcy Act, and modifications in the rights of security holders of solvent business enterprises. In the study of reorganization under the Bankruptcy Act, special emphasis will be placed upon the rights of creditors and shareholders under the reorganization plan. (Materials to be announced.)
2 units, autumn and winter quarters (SPAETH)

234. **Admiralty.**—This course will be devoted principally to the study of the scope and subject matter of admiralty jurisdiction; the maritime lien; the rights of maritime workers; and the effect of state legislation within the admiralty jurisdiction. Some attention will also be given to such subjects as salvage; general average; limitation of liability; and the carriage of goods. (Mimeographed cases.)
4 units, autumn quarter (MORRISON)

241. **Wills.**—Intestate succession, with attention to special features of California law. The making of wills, including competency, testamentary intent, formalities (holographic and witnessed wills), and integration. Undue influence, fraud, and mistake. Revocation, including dependent relative revocation. Ademption and lapse of gifts by will. Jurisdiction and need for probate and administration. Order of resort to decedent's assets to satisfy claims and testamentary gifts; and other problems of administration. Prerequisite: Law 206, Real Property. Mechem and Atkinson, *Cases on Wills and Administration* (4th ed.).
4 units, autumn quarter (TURRENTINE)

242. **Future Interests.**—Creation, transfer, and characteristics of future interests in real and personal property. Construction problems, including gifts to classes and the Rule in Shelley's Case. Illegal conditions and restraints on alienation; suspension of the power of alienation; the Rule Against Perpetuities; powers of appointment. Attention is paid to problems of draftsmanship. Prerequisite: Law 206, Real Property. (Casebook to be announced and selected cases.)
4 units, spring quarter (TURRENTINE)

243. **Water Rights.**—A study of water rights in the Western states. (Study material to be announced.)
No units (KIRKWOOD)

249. **Office Practice.**—(*a*) A practical course covering the fundamental principles of drafting legal documents, including wills, trusts, mortgages and conditional sales, bank guaranties, contracts, conveyances and leases, partner-

ship agreements, etc. (*b*) A study of the more important problems of office management, including division ot work, office personnel, office records, correspondence, filing system, time recording, valuation and billing, and office library. (*c*) Lectures by a group of outstanding trial lawyers and appellate judges on the "Trial of a Law Suit." These lectures cover all phases of a trial from the preparation for trial through final appeal. Assigned reading and selected cases. Prerequisite: five quarters of law study. Class limited to twenty-four students.
1 unit, autumn, winter, and spring quarters (BRENNER)

252. Evidence.—Problems of remoteness and undue prejudice, including habit and character evidence; witnesses, including competency, privilege, examination, impeachment, and rehabilitation; illegally obtained evidence; opinion evidence; hearsay and the exceptions to its exclusions; authenticity of writings, the "best evidence" rule; burden of proof and presumptions; function of judge and jury. Morgan and Maguire, *Cases on Evidence* (3d ed.) and supplementary materials.
3 units, winter and spring quarters (HURLBUT)

253. Practice.—Procedural problems confronting the lawyer in the commencement and prosecution of civil actions, omitting the subjects of pleading and evidence. The problems are studied as nearly as possible in the order in which they arise in practice, including necessity for a cause of action, venue: jurisdiction; methods of obtaining judgments without formal action in court; process; appearance; provisional remedies; motions; trial; verdict; judgment; execution; costs; new trial; appeal. (Casebook to be announced.)
4 units, spring quarter [Not given in 1954–55]

253a. Trial and Appellate Practice.—This course is concerned with certain problems which arise in the course of litigation in state and federal courts. It deals with four major subjects: getting a case started; preparation for trial; trial; and appeal. The following topics are covered: jurisdiction, venue, pretrial motions, provisional remedies, discovery, summary judgment, selection of the jury, trial procedure and motions, and the handling of a case on appeal. (Casebook to be announced.)
4 units, spring quarter (McDONOUGH)

254. Federal Jurisdiction and Procedure.—Development of the federal judicial system. Jurisdiction of the District Courts, the Courts of Appeals, and the Supreme Court. Practice under the Rules of Civil Procedure; procedure on appeal and certiorari.
3 units, winter quarter (TURRENTINE)

256. Persons.—Marriage: contract to marry, interference with and breach thereof; legal qualifications and requirements for marriage; annulment. Divorce: grounds for, defenses, procedure, award and enforcement of alimony. Separate maintenance and separation agreements. Parent and child: legitimacy; custody, adoption, and support. (Study material to be announced.)
3 units, autumn quarter (————)

257. Conflict of Laws.—A study of the influence which considerations of the jurisdiction of a state and considerations of foreign laws have upon the decisions of courts in cases involving events or things or persons under foreign jurisdiction. The study includes particularly problems of the jurisdiction of state and of courts, of the effects of foreign judgments and decrees, of legal domicile, or divorce, and of actions for foreign wrongs; property interests, decedents' estates, torts, legal capacity, marriage, marital interests, and contracts. Cheatham, Goodrich, Griswold, and Reese, *Cases and Materials on Conflict of Laws* (3d ed.).
3 units, winter and spring quarters (McDONOUGH)

267. Legal History.—Seminar. A study of the origins and development of the principal English legal institutions: the common law courts, the jury, the high court of Parliament and the courts of Chancery and Star Chamber, including their respective modes of procedure. Consideration will be given to the influence of various social and political factors on these institutions. About eight class hours are devoted to selected topics in American legal history, emphasizing the problems of creating a new legal system and the influence of the frontier.
3 units, spring quarter (Hancock)

268. Jurisprudence.—Seminar. A study of legal analysis, legal logic, and the process by which judicial decisions are made; the nature and significance of legal rules, the force of precedents and the technique of statutory construction, the role of the jury. Ideas and materials are chiefly drawn from writings in the field of modern American jurisprudence. Selected judicial opinions, articles, and textbooks are used for purposes of illustration.
3 units, autumn quarter (Hancock)

269. Estate Planning.—Seminar. Problems relating to the disposition of property, planning and drafting the dispositive and administrative provisions of trusts and wills, including the creation of future interests and class gifts and the powers of trustees and executors, and the effects of income and estate tax on property transfers.
2 units, winter and spring quarters (Scott, Turrentine)

270. International Law and American Foreign Policy.—Seminar. A study of international and domestic laws affecting the United States' participation in world affairs; an analysis of Constitutional structure, legislative provisions, executive techniques, and judicial functions utilized in forming and carrying out American foreign policy; exercises in practical international legal problems in private practice, in American government agencies, and in international organizations. Open to specially qualified graduate students in other departments, on permission of the instructors. Bishop, *International Law—Cases and Materials*, and other assigned readings.
2 units, winter and spring quarters (Angelo, Spaeth)

271a. The Business of the Supreme Court.—Seminar. A study of current Supreme Court litigation, including petitions for certiorari and appeals, cases set down for argument, and decided cases; analysis of the craftsmanship and approach of particular Justices; consideration of the manner in which the Court conducts its business and on acquiring some further understanding of the Court as an institution and its role as an instrument of government.
3 units, spring quarter (Mann)

274. Municipal Corporations.—Creation, consolidation, and dissolution of municipal corporations. Municipal powers, contracts, quasi-contractual liability, and debt limitations. City zoning, licenses, and franchises. Tort liability of municipalities. Casebook to be announced.
4 units, autumn quarter (Scott)

275. Taxation.—This course deals primarily with federal estate, gift, and income taxation, including federal tax procedure. Some attention will also be given to state inheritance taxation. Griswold, *Cases on Federal Taxation* (4th ed.); *C.C.H. Federal Taxation—Current Law and Practice* (loose-leaf).
3 units, autumn and winter quarters (Morrison)

275a. Advanced Problems in Taxation.—A seminar course dealing with advanced and current problems in the law of federal taxation. Tax practitioners participate as guest lecturers. Prerequisite: Law 275, Taxation, or its equivalent.
3 units, autumn quarter; 3 units, *spring quarter (Thurman)

276. Administrative Law.—A survey of administrative powers and procedure in various types of administrative action, including investigation, rule-making, and adjudication; the effect of administrative determinations; the extent and methods of judicial control over such determinations. (Casebook to be announced.)
4 units, autumn quarter (NEAL)

277. Government Regulation of Business.—A comparative study of some important problems common to the antitrust and public utility fields, contrasting the legal concepts and techniques employed in enforcing competition with those employed under comprehensive regulatory statutes. The course is meant to serve both as a general course for students having no intention to specialize and as a foundation for specialized seminar work in the trade regulation or public utility fields. Ordinarily it will be a prerequisite for such further work. Schwartz, *Cases and Materials on Free Enterprise and Economic Organization.*
4 units, autumn quarter (NEAL)

278. Criminal Law.—Seminar. During the first portion of the seminar, selected topics are discussed on the basis of assigned readings. Problems of procedure and administration are emphasized. Meanwhile, students select special topics for intensive individual work. During the second quarter each student presents for group criticism and evaluation the results of his research. No limitations of subject matter within the broad field of criminal studies are imposed, but each student is expected to develop his own effort, under guidance, into a paper on the scale of a law review student note.
2 units, autumn and winter quarters (———)

279. Trade Regulation.—A seminar on the antitrust laws and related statutes regulating competition. (Materials to be announced.)
2 units, autumn and winter quarters (NEAL)

280. Labor Law.—A study of the law relating to union organization, recognition, and collective bargaining, with consideration of underlying social and economic factors involved; development, function, and administration of the collective-bargaining agreement—its scope and legal status; examination of federal and state legislation, and interpretations thereof, affecting collective bargaining; arbitration of grievances under collective-bargaining agreements; relations between unions and their members. Mathews, editor, *Labor Law Cases and Materials* (1953 ed.).
4 units, autumn quarter (MANN)

280a. Problems in Collective Bargaining.—A seminar dealing with collective-bargaining situations presenting special problems for the labor lawyer. Consideration of actiual practices and techniques of advocacy in the field of collective bargaining and labor arbitration. Leading representatives of labor, management, and government agencies meet with the seminar on occasion and direct the discussion.
2 units, winter and spring quarters (MANN)

281. Food and Drug Law.—A seminar in the historical perspective, legislative history, substantive provisions, administrative regulations and enforcement of the Federal Food, Drug and Cosmetic Act and related laws. Three volumes of Kleinfeld & Dunn, *Federal Food, Drug and Cosmetic Act* (1938–49; 1949–50; 1951–52).
2 units, winter and spring quarters (HUDSON)

285. Directed Research.—Research upon problems in any part of the field of the law may be carried on with the consent of the instructors concerned. Frequent conferences with the instructor are held for purposes of report and

guidance. The results of the research are finally embodied in a paper. Open to candidates for the degree of Master of Laws and to students in their last year of study for the degree of Bachelor of Laws.
Autumn, winter, and spring quarters **By arrangement**

286. Special Study.—This course is a rapid review of fundamental law courses, with written exercises. The course is open only to graduates of this School.
Summer and winter quarters (SILBAUGH)

287. Law Review.—Editors of the *Law Review*, elected on the basis of academic performance, usually at the beginning of their second year, receive no credit, but are excused from Law 223 (Legal Writing).

Moot Court.

Patent Law.—A series of eight lectures on the patent system and patent law.
Winter quarter (LYON)

LIBRARIES

Nathan van Patten, Professor of Bibliography, Emeritus
Nina Almond, Librarian and Consultant in Research, Emeritus (Hoover Library)
Elizabeth Hadden, Alice Newman Hays, William Owens, Minna Stillman, Helen Binninger Sutliff, Associate Librarians Emeriti

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Raynard C. Swank, Director of University Libraries
Elmer M. Grieder, Associate Director of Libraries
Joseph Belloli, Chief Reference and Humanities Librarian
Gilbert L. Campbell, Chief Science and Engineering Librarian
Alice Charlton, Chief Catalog Librarian
Frederic M. Falconer, Chief Biological Sciences Librarian
Jeannette McCrory Hitchcock, Chief of Division of Special Collections, and Keeper of Rare Books
Clara S. Manson, Librarian, Lane Medical Library
Fred John Priddle, Administrative Assistant
William B. Ready, Chief Acquisition Librarian
Irene Barquist, Principal Gift and Exchange Librarian
Edward E. Colby, Music Librarian
Kathryn Nell Cutler, Mineral Sciences Librarian
LeVern W. Cutler, Director, Business Library
Edith Hanson Falconer, Principal Order Librarian
Irma Goldner, Principal Document Librarian
Augusta E. Houseman, Physics and Chemistry Librarian
Ivan H. Johnson, Principal Circulation Librarian
John C. Leary, Law Librarian
Philip Taggart McLean, Librarian, Hoover Library
Ruth Perry, Chief, Reference Division, Hoover Library
Madeline G. Wilkinson, Principal Serial Librarian
Ruth Scibird, Curator of the Stanford Collection
———, Education Librarian

The University Library is open Mondays through Fridays from 8:00 A.M. to 10:00 P.M. On Saturdays the hours are from 8:00 A.M. to 4:00 P.M., and on Sundays from 1:00 P.M. to 5:00 P.M. These hours do not apply to the Reserved Book Room, which is open Mondays through Saturdays from 8:00 A.M. to 10:00 P.M. and Sundays from 1:00 P.M. to 10:00 P.M. Books not on reserve or otherwise restricted may be borrowed by those entitled to library privileges.

The University Library may be used by all registered students. Alumni of the University may obtain library privileges upon securing the Director's approval and the payment of an annual fee of five dollars. Other qualified persons will be entitled to use of the library upon obtaining the Director's approval and the payment of an annual fee of ten dollars.

Including The Hoover Library on War, Revolution, and Peace and the Lane Medical Library, the University Libraries contain more than 1,200,000 catalogued volumes and 1,800,000 uncatalogued books and pamphlets which are organized for use.

The library building is well adapted to the needs of advanced and graduate students. Its seminar rooms and certain of the rooms set aside for special collections, i.e., Felton, Hopkins, and Robinson, are used for classes requiring close contact with library materials. Cubicles and individual tables on each stack level are available for the use of graduate students.

The Document Library brings together the library's collection of municipal, state, and federal documents. It is especially strong in the publications of the United States, Great Britain, Canada, Australia, and the United Nations. Those of other countries are being added as fast as circumstances permit.

The Hoover Library on War, Revolution, and Peace is housed in the library building which was completed in March 1941. The main floor provides two large exhibition rooms, quarters for the Ray Lyman Wilbur Collection, a reading room, map room, and administrative offices. The second floor contains a series of private studies and offices for the research staff. The great tower which rises to a height of 280 feet contains twelve stack levels for the book collections and adequate quarters for the Herbert Hoover Archives and the other extensive archive collections of the library. In the basement are stacks for the library's newspaper collections. The Hoover Library contains approximately 275,000 printed and manuscript items relating to World War I and the period of reconstruction, including material from all nations both combatant and neutral and to World War II. It is rich in government documents, delegation propaganda at the peace conference, files of society publications, and newspapers.

The Hopkins Transportation Library is a collection of approximately 26,000 volumes and pamphlets relating to transportation. Mr. Timothy Hopkins, in 1892, presented to the University his private library comprising about 2,000 books and personally provided for its maintenance and growth for many years. The collection is general in scope, including material relating to the history, economics, and engineering of rail, highway, water, and air transportation. It is especially rich in state and government reports, the reports of individual railroads, both in the United States and Europe, and historical material relating to railroads. It is under the supervision of the Reference and Humanities Division.

The Charlotte Ashley Felton Memorial Library was established in 1929 by Mrs. Kate Felton Elkins. The collection is devoted to first and other rare editions in American and English literature. The donor has provided liberally for its maintenance and development.

The Law Library, including the holdings at Crothers Hall, contains over 80,000 volumes. It contains practically complete sets of the reports of the courts of England, Scotland, Ireland, Canada, the United States, and the several states, together with a valuable collection of statutes, treatises, and periodicals.

The Lane Medical Library was founded by the directors of Cooper Medical College in accordance with the bequest of Mrs. L. C. Lane. It is located at Sacramento and Webster Streets. San Francisco, adjoining the medical school. The library contains about 127,000 volumes, and is particularly rich in periodicals. Over 1,700 journals are currently received.

Important special collections are the Barkan Library of Ophthalmology and Otolaryngology, and the Medical History Collection, both endowed by Dr. Adolph Barkan.

The Jordan Library of Zoology is a collection consisting largely of works on ichthyology, to a considerable extent made up of authors' separates, accumulated by Chancellor Jordan and members of the Department of Zoology, bound, indexed, and cataloged. The more voluminous publications such as the works of Cuvier, Lacépède, Bloch, Bleeker, Günther, and others are well represented. These, supplemented by the proceedings of various societies and institutions, make a collection of books of great value to advanced students and investigators. The library is conveniently located in the Natural History Museum, near the laboratories and collections.

The Biology Library, housed in Jordan Hall, is a combination of the former departmental libraries of botany, physiology, zoology, and entomology, with some works on general biology, and now comprises about 22,000 volumes, together with current files of 235 periodicals. Its aim is to further the efforts of students and research workers, and when complete, it should cover the literature of all phases of biological science represented in the courses and research activities of the University.

The Engineering Library, opened in 1942, serves the School of Engineering. It includes material in civil, electrical, mechanical, and mining engineering and related materials from the main library. It is located on the first floor of the University Library building and has its own reading room.

The Mineral Sciences Library, built around the Branner Geological Library, includes material relating to geology, paleontology, mineralogy, geography, mining, and metallurgy. Its files of journals, transactions of scientific societies, and state government reports are exceptionally complete.

The Food Research Institute Library, although intended primarily for the use of the staff of the Food Research Institute, is now one of the University Libraries and available to properly qualified readers.

The Hopkins Marine Station Library provides an adequate working collection in the fields of marine biology and related subjects.

The Cubberley Library, with its three reading rooms and bookstacks, is located on the second floor of the School of Education building. The book collections, which exceed 60,000 volumes, are being reclassified and recataloged. Of special note are the textbook collection and the file of college and university catalogs.

The Graduate School of Business Library, reading rooms, and bookstacks are in the Graduate School of Business building. Its collections include 19,000 volumes, more than 119,000 miscellaneous reports, government documents, and pamphlets, and approximately 900 periodicals.

The Memorial Library of Music was established by Mr. and Mrs. George T. Keating as a memorial to the Stanford men and women who lost their lives in World War II. This is a collection of original manuscripts of the works of the major composers together with first and other important editions of the engraved and printed scores of their compositions. Already third in rank among American libraries for its possession of musical manuscripts, the Memorial Library of Music possesses such treasures as the original manuscripts of Mascagni's *Cavalleria Rusticana*, Flotow's *Martha*, Cherubini's *Medée*, Brahms's Hungarian Dances (1–3) and *Tragic Overture*, Johann Strauss II's *Eine Nacht in Venedig*, and Stravinsky's *Danses Concertantes*. This library is open to qualified users by appointment. It is located in Room 310 in the University Library building.

COURSE OF INSTRUCTION

1. Use of the Library.—An introduction to the library with emphasis on major types of material and on the use of catalogs, bibliographies, indexes, abstracts, and other aids to study. Primarily for freshmen and sophomores.
1 unit, autumn, winter, and spring quarters (LIBRARY STAFF) T 11

SCHOOL OF MEDICINE

WINDSOR COOPER CUTTING, M.D., Dean
GEORGE BERNARD ROBSON, M.D., JAY WARD SMITH, M.D., Associate Deans

ADMISSION TO THE SCHOOL OF MEDICINE

The first-year class in the School of Medicine is limited to sixty-two students. Selection is made on the basis of scholarship and promise, from those applicants who fulfill the following requirements:

1. Graduation from high school or its equivalent. (Special students are not admitted to the School of Medicine.)

2. Taking of the Medical College Admission Test of the Educational Testing Service. Applicants should take this test when it is given in the various colleges throughout the United States in the spring of the year prior to application for admission to the School of Medicine.

3. Completion of three full years of college work, totaling 135 quarter units or 90 semester units, with an average grade of not less than C as defined by Stanford University (A, B, C, and D are passing grades.)

4. Completion of the following courses at Stanford University or equivalent courses accepted from other institutions:

a) Biology (15 quarter units), including general biology or general zoology, comparative anatomy of the vertebrates or comparative biology, and vertebrate embryology. At least one-half of this shall consist of laboratory work.

b) Chemistry (21 quarter units), including inorganic chemistry and qualitative analysis (12 quarter units), quantitative analysis (4 quarter units), organic chemistry (5 quarter units).

c) Physics (12 quarter units), including mechanics and heat, electricity, optics, and atomics.

d) English (9 quarter units).

e) A reading knowledge of German or French, satisfied by completing 18 quarter units of university foreign language courses or by passing an examination.

f) In addition to the above minimum admission requirements, it is recommended that prospective medical students, whenever possible, complete four full years of college work leading to the degree of Bachelor of Arts or Bachelor of Science and that they include in their programs of study the following additional courses, or their equivalents:

Biology 25 (Genetics), 4 units
Chemistry 125 (Organic Chemistry, Lec.), 3 units
Chemistry 122, 124 (Organic Preparations), 6 units
Elementary Physical Chemistry, 3 units
Statistical Methods, 5 units
Both French and German, each through the equivalent of 9 quarter units of second-year college reading.

The following courses at Stanford University meet these requirements, and equivalent courses are accepted from other institutions:

a. Chemistry, 25 quarter units, including:

Chemistry 1, 2, 3 (General Inorganic Chemistry), 14 units
Chemistry 110, 111 (Quantitative Analysis), 5 units
Chemistry 121, 123 (Organic Chemistry), 6 units

b. Physics, 13 quarter units, including:
    Physics 21, 22 (Mechanics and Heat), 4 units
    Physics 23, 24 (Electricity), 4 units
    Physics 28 (Elementary Optics), 1 unit
    Physics 29 (Optics and Atomics), 4 units

c. Biology, 15 quarter units, including:
    Biology 21 (Introduction to Invertebrate Zoology), 5 units†
    Biology 22 (Comparative Vertebrate Anatomy), 5 units
    Biology 23 (Comparative Vertebrate Embryology), 5 units

d. English, 9 quarter units

It is recommended, in addition, that the student do about 25 units of advanced work in some *one* field. This work should be done in *one* of the arts or sciences in which the student has a special interest and for which he believes he possesses a special aptitude. Should his choice fall in one of the required fields named above, this work should then be the indicated number of units in excess of the unit requirements in that particular field. The purpose of this recommendation is to bring into the School of Medicine students who have not only met the minimum requirements for the study of medicine, but who have also acquired training in some *one* of the arts or sciences sufficient to apply that knowledge effectively to the advancement of medicine.

No conditions are permitted.

APPLICATION FOR ADMISSION

Full particulars concerning application for admission, credentials required, and closing dates for filing transcripts of record and recommendations will be found in the *School of Medicine Bulletin.*

Applicants for admission to the School of Medicine, or for advanced standing in medicine, should communicate with the Office of Admissions, Stanford University, Stanford, California; those desiring information concerning the upper classes of the School of Medicine (i.e., from the fifth to the twelfth quarters) should communicate with The Dean, Stanford University School of Medicine, 2398 Sacramento Street, San Francisco 15, California.

CURRICULUM IN MEDICINE

The required period of study for the degree of Doctor of Medicine is twelve quarters plus the intern period. The work of the first four quarters is given at Stanford University and is devoted to anatomy, bacteriology, biochemistry, histology, neurology, and physiology. The next eight quarters are devoted to work in the pharmacological, pathological, and clinical laboratories, and in the hospital wards and the out-patient department in San Francisco. The intern period is spent in hospital work.

In order to correlate the work of some of the departments and to facilitate research in others, all courses in medicine, except those in anatomy, bacteriology, biochemistry, and physiology, are given in San Francisco.

DEGREE OF BACHELOR OF ARTS

Regularly enrolled students in the School of Medicine who are candidates for the M.D. degree may be recommended for the degree of Bachelor of Arts by the faculty of the School of Medicine upon completion of at least 45 units of the first-year course of the medical curriculum, and the fulfillment of the established University requirements of 180 units with satisfactory scholastic record.

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† Students who have taken Biology 1, 2, and 3 are exempt from this specific requirement.

FEES

The tuition and required fees for students in the School of Medicine are $290 per quarter, which includes all fees regularly charged except deposit fees or charges for breakage or loss. (A deposit of $50 [not refundable] is required of each applicant admitted to the entering class, or to advanced standing, in the School of Medicine on or before January 15, or within ten days after receiving notice of admission following the final selection.

Drafts and checks should be drawn for the exact amount to the order of Stanford University School of Medicine, as no change can be returned to students on checks or drafts. (For checks incorrectly made out or checks returned by the bank a fee of $2 will be charged the student.)

FOURTH-YEAR STUDENTS ELECTIVE QUARTER

Students in the School of Medicine who have attained a grade-point average of 3.0 or better for three years' work in the School of Medicine may be excused from the required courses during any one quarter of their senior year, providing they spend that quarter in full-time elective work under the direction of the Executive of any department willing to accept the student for such special elective studies.

ELECTIVE COURSE

Elective X.—Thesis to be arranged prior to registration with Executive of department in which research is to be done. Open to all students in the School of Medicine.

50 hours **By arrangement**

ANATOMY

Charles Haskell Danforth, Arthur William Meyer, Professors Emeriti

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William Walter Greulich, Donald James Gray, Hadley Kirkman, Professors
David Lee Bassett, Robert Stuart Turner, Associate Professors
Malcolm Ray Miller, Donald L. Stilwell, Jr., Assistant Professors
F. Thomas Algard, Instructor

Instruction in the Department of Anatomy is planned primarily to meet the needs of students of medicine but, in so far as facilities permit, all of the courses are open to other properly qualified students in the Upper and Graduate divisions. Those who are not registered in medicine but wish to take work in the department should make arrangements in advance with the instructors concerned.

Facilities are available for a limited number of doctors of medicine, or others with equivalent training, who may wish to do special dissections or pursue work on problems within the scope of the department. Graduate study may be undertaken in such aspects of anatomy as are indicated by the courses listed. Programs combining work in anatomy and other fields of biology or medicine may be arranged.

Advanced Degrees.—Students desiring to become candidates for advanced degrees in anatomy should consult the *Information Bulletin* where the general University regulations are summarized. Candidates for the degree of Doctor of Philosophy will be expected to have done the equivalent of at least the basic course work offered in the department. All programs leading to an advanced degree in anatomy must be worked out individually and approved by the department faculty. It is expected that an average grade of B will be maintained. Approval must be obtained by graduate students in other departments who wish to elect anatomy as a minor.

Library.—In addition to a good working library in the department, students have access to the main and branch libraries on the campus and the Lane Medical Library in San Francisco.

COURSES OF INSTRUCTION

112. Mammalian and Human Embryology.—A detailed laboratory study of early embryogenesis, and organogenesis with lectures on normal and abnormal development. For senior and graduate students. Prerequisites: Biology 22, 23, and permission of the instructor.

5 units, spring quarter (Algard) MWF 11, WF 1–4

114. Practical Anatomy.—A brief survey of the human body by means of dissection and study of anatomical preparations. Lectures and demonstrations. Designed for students of physical therapy, nursing, hygiene, bacteriology, and physical education, or others similarly qualified, but not open to premedical or medical students.

5 units, winter and *summer quarters (———) TWThF 1–4

121. Dissection of the Human Body.—Each student dissects one side of the body. Lectures and demonstrations. Required of medical students. A few non-medical students may be admitted by special arrangement.

21 units
9 units, autumn quarter (Gray, Algard, Graulich) MTWThFS 9–12
9 units, winter quarter (Bassett, Stilwell, Greulich) MTWThFS 9–12
3 units, spring quarter (Bassett, Gray) M 9–12, Th 1–4

122. Normal Histology and Microscopic Anatomy.—A course dealing with the elementary structure and activities of the animal cell, the histology and development of the tissues, and their combination into the organs of the vertebrates, with special reference to man. Required of medical students and open to other qualified students so far as laboratory space permits.

8 units
4 units, autumn quarter (Kirkman, Turner) WThF 1–4
4 units, winter quarter (Kirkman, Miller) WThF 1–4

123. Neurology.—A study of the structure of the central nervous system of man by means of dissections and prepared slides, supplemented by dissections of the central nervous system of other mammals. Required of medical students. Prerequisite: Anatomy 122.

5 units, spring quarter (Turner, Miller, Stilwell) M 1–5, TTh 9–12

142. Introduction to Endocrinology.—Lectures on the anatomy and physiology of the endocrine glands. For seniors and graduate students. Prerequisites: Biology 1, 2, 3, and 22, or equivalent, and permission of the instructor.

2 units, autumn quarter (Miller) WF 4–5

145. Individual Work.—When circumstances warrant, work not specifically provided for in the scheduled courses may be carried on under the supervision of one or more members of the staff.

Any quarter (Staff) By arrangement

201. Topographical Anatomy.—The course includes laboratory study of sections of fetal, infantile, and adult cadavers, dissected and specially injected preparations, and student reports relevant to this material. Open to students who have completed Anatomy 121 and 122.
2 to 5 units, autumn quarter (BASSETT) By arrangement

203. Research.—Work involving a research program must be arranged for individually and approved by the department faculty.
Any quarter (STAFF) By arrangement

204. Dissection of the Fetus.—This course may serve as a general introduction to fetal anatomy or provide for a review and intensive study of selected regions. Open to a limited number of students. Anatomy 121 and a course in embryology will ordinarily be considered as prerequisites.
Autumn, *winter, and *spring quarters (ALGARD) By arrangement

207. Histological and Cytological Technique.—A study of the general principles of microtechnique with practice in their application. For graduate students only. Limited registration.
3 to 6 units, autumn and *winter quarters (KIRKMAN) By arrangement

208. Special Cytology.—A practical laboratory introduction to special phases of nuclear and cytoplasmic cytology. Chief emphasis is placed upon the use of technical methods for the study of cytoplasmic organoids and inclusions. Limited registration. Prerequisites: Anatomy 122 and Biology 185 or equivalent.
3 to 6 units, autumn and *winter quarters (KIRKMAN) By arrangement

BACTERIOLOGY AND EXPERIMENTAL PATHOLOGY

WILFRED HAMILTON MANWARING, EDWIN WILLIAM SCHULTZ, Professors Emeriti

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CHARLES EGOLF CLIFTON, SIDNEY RAFFEL (Executive), Professors
HELEN SHARP THAYER, DIGHTON ROWAN, Instructors

The Department of Bacteriology and Experimental Pathology offers, in addition to the courses required of students of medicine, a group of courses intended to cover the basic needs of students who wish to specialize in bacteriology. While no undergraduate program leading to the degree of Bachelor of Arts is offered by the department, seniors who have completed all of the required premedical sciences will be admitted to the courses in medical bacteriology in so far as laboratory space will permit after medical and graduate students have been seated. Undergraduates desiring to enroll in these courses must obtain permission from the instructor in charge prior to registering for the autumn quarter. Students who fall below an average grade of C in bacteriological subjects completed will become ineligible for more advanced courses.

HIGHER DEGREES IN BACTERIOLOGY

Master of Arts.—Candidates for the degree of Master of Arts in bacteriology will be expected to complete the following courses: Bacteriology 101, 225, 226, 231, 238, 240, 314, 315; Biochemistry 141, 142, 143, 144, together with at least 15 units of research work bearing on the thesis subject. The latter may be in the form of a literature review acceptable to the department faculty. A grade average of B in bacteriological subjects is required for admission to thesis work. Each candidate is expected to pass an oral examination of about two hours' duration covering the fundamentals of bacteriology, immunology, and virology. A reading knowledge of French or German is required.

Doctor of Philosophy.—Candidates for the degree of Doctor of Philosophy will follow such courses as are approved by the major professor and the department faculty, subject to general University regulations covering this degree. The following courses should be included in the first year or two of graduate work, if the equivalents were not included in the undergraduate program: Anatomy 114; Biology 20, 21, 23, 25, 29, 103, 124, 148; Chemistry 141, 142, 143, 144, 145; Psychology 60; completion of the foreign-language requirements. The following courses are strongly recommended: Anatomy 122, 123; Biology 29; Chemistry 171, 173, 175, 177, 243; Mathematics 10, 11, 22, 23.

The following courses in the department are normally covered during the first year of graduate work: Bacteriology 225, 226, 231, 238, 240, 250, 314, 315. A grade average of B in bacteriological and related subjects is required for admission to research work. In addition to this required grade average the student is expected to pass an oral examination covering the fundamentals of general and medical bacteriology, immunology, and virology before being admitted to research work bearing on his dissertation. Students who enter the department with advanced standing in bacteriology from other institutions are expected to take the final examination in Course 225, and in such other courses as may be stipulated, at the earliest time these examinations are regularly scheduled.

COURSES OF INSTRUCTION

101. General Bacteriology.—A general survey course covering the fundamental aspects of bacteriology. Prerequisites: General Biology and General Chemistry.
5 units, spring quarter (CLIFTON AND ASSISTANTS) Lec. MWF 1; Lab. MWF 2–4

225. Medical Bacteriology.—A course of lectures covering the fundamentals of pathogenic bacteriology, with particular reference to the bacterial forms of importance in infectious diseases of man. Must be accompanied by Course 226. Prerequisites: required premedical sciences.
5 units, autumn quarter (RAFFEL, CLIFTON, ROWAN) MTWThF 9–10

226. Medical Bacteriology.—A course of laboratory exercises paralleling Course 225, with emphasis on the procedures employed in the diagnosis of bacterial infections and on public health laboratory methods. Must be accompanied by Course 225. Limited to seventy-nine students.
5 units, autumn quarter (RAFFEL, CLIFTON, THAYER, ROWAN, AND ASSISTANTS) MTWThFS 10–12; Lec. S 9

231. Immunology and Serology.—An advanced course of lectures, demonstrations, and laboratory exercises covering infection and immunity and antigen-antibody reactions. Prerequisites: Biology 103, Bacteriology 225 and 226.
6 units, winter quarter (RAFFEL, THAYER) Lec. MWF 10; Lab. MTW 1–4

238. Bacterial Physiology.—A course of lectures on the physical and chemical aspects of bacterial growth and behavior. Prerequisites: Bacteriology 101, or 225 and 226, or equivalents.
5 units, winter quarter (CLIFTON) MTWThF 9

240. Virology.—A course of lectures and demonstrations covering the main aspects of viruses and viral diseases. Prerequisites: Bacteriology 225, 226, and 231, or equivalents.
6 units, spring quarter (ROWAN, THAYER) Lec. MTWThF 9; Lab. Th 1–4

250. Advanced and Special Work.—Students who have completed the necessary basic courses with a satisfactory grade average may be admitted by the instructor to advanced work on an informal basis in one of the following fields: (*a*) general bacteriology, including bacterial physiology; (*b*) medical bacteriology; (*c*) immunology and serology; (*d*) virology.
5 to 10 units, any quarter (CLIFTON, RAFFEL, ROWAN) By arrangement

300. Research.—Students who have satisfactorily completed the necessary foundation courses may elect research work in one of the following fields: (*a*) general bacteriology, including bacterial physiology; (*b*) pathogenic bacteriology; (*c*) immunology and serology; (*d*) virology. A grade average of B in bacteriological subjects is required for admission to research or thesis work.
5 to 10 units, any quarter (CLIFTON, RAFFEL) By arrangement

314. Current Literature.—A weekly conference on current articles in the field of bacteriology. Required of all graduate students.
1 unit, spring quarter (CLIFTON) By arrangement

315. Seminar.—Reports and discussions on selected topics. Required of all graduate students.
1 unit, spring quarter (CLIFTON) By arrangement

316. Literature Reviews.—A review of the literature on special topics assigned by the instructor.
3 to 5 units, any quarter (CLIFTON, RAFFEL, ROWAN) By arrangement

CHEMISTRY

GEORGE SUTTON PARKS (Executive), HUBERT SCOTT LORING, JAMES MURRAY LUCK, Professors
AMOS CLARK GRIFFIN, Associate Professor

[For outline of courses in biochemistry, see pages 138–139.]

MEDICINE

GEORGE DE FOREST BARNETT, ARTHUR LEONARD BLOOMFIELD, Professors Emeriti
SAMUEL H. HURWITZ, THOMAS GEORGE INMAN, WALTER FRANK SCHALLER, Clinical Professors Emeriti
HARRY A. WYCKOFF, Associate Professor Emeritus
LOVELL LANGSTROTH, Associate Clinical Professor Emeritus
MARTIN J. SEID, Assistant Clinical Professor, Emeritus

———— (Executive), CHARLES WENTWORTH BARNETT, GEORGE STEPHEN JOHNSON (Neuropsychiatry), JOHN K. LEWIS, ROBERT REID NEWELL, WILLIAM H. NORTHWAY, HALE F. SHIRLEY, Professors
JOSEPH HENRY CATTON, GARNETT CHENEY, ROLAND A. DAVISON, EUGENE MARK FARBER, H. CORWIN HINSHAW, RUSSEL VAN ARSDALE LEE, JAY MARION READ, GEORGE BERNARD ROBSON, DWIGHT LOCKE WILBUR, Clinical Professors

John A. Luetscher, Jr., Henry Newman, Lowell Addison Rantz, David A. Rytand, Associate Professors

Leona Mayer Bayer, Walter Beckh, Cabot Brown, William George Burkhard, Lazarre J. Courtright, Frederick A. Fender, Lindol R. French, Byron E. Hall, Josephine R. Hilgard, George V. Kulchar, Lester S. Lipsitch, Carol McKenney, Hugh Rose, Jr., Otto E. L. Schmidt, Charles F. Sweigert, Harold G. Trimble, Robert Preston Watkins, Edgar Wayburn, Forrest M. Willett, Associate Clinical Professors

William Philip Creger, Herbert N. Hultgren, Jay Ward Smith, Theodore H. Spaet, Clarence M. Tinsley, Assistant Professors

Charles D. Armstrong, Louis Shattuck Baer, DeWitt Kinne Burnham, Claude P. Callaway, John Ford Card, Howard Crail, James T. Duncan, J. Lloyd Eaton, Ervin Epstein, Knox H. Finley, Meyer W. Friedman, Kenneth D. Gardner, Henry Gibbons III, Morton R. Gibbons, Jr., Clyde C. Greene, Jr., Francis S. Greenspan, James Alexander Hamilton, Marlow B. Harrison, Joseph L. Henderson, Henry M. Hodgson, Arne Ely Ingels, Herbert N. Jacobs, Kalmen Klinghoffer, Joseph P. Kriss, Marcus Krupp, William C. Kuzell, Charles S. Lincoln, Ernest George Lion, Albert J. Lubin, *William Frederick Luttgens, Martha W. MacDonald, Roger B. McKenzie, William W. Newman, Sadie Dernham Patek, Edward Persike, Jr., John J. Prusmack, Joseph F. Sadusk, Jr., Arthur Selzer, Ben Shenson, Robert Lee Smith, Willard G. Snow, Harold C. Sox, Andrew B. Stockton, F. Joseph Thal, Leon J. Whitsell, Assistant Clinical Professors

———, Instructor

Alan Abrams, Richard Henry Barr, Winston W. Benner, Donald Earl Bernstein, Frederick Gurdon Bills, Henrik Leo Blum, Samuel Coe Bonar, John Sewall Brown, Sergius Bryner, Karl Edward Carlson, Foon Poo Chin, William H. Clark, Robert E. Cook, Paul M. Crossland, Grace Garrett DeBell, William Michael Enright, Anthony S. Felsovanyi, Manuel H. Fertman, Mildred Been Fertman, Marshall J. Fiese, Walter J. Friedlander, Joseph J. Furlong, Emir A. Gaw, Alfred C. Godward, Thomas Gonda, John McRoberts Harter, Milton M. Hartman, Harold I. Harvey, Leo Edward Hollister, Herbert H. Holman, Walter E. Hook, J. Lyman Hurlbut, Herbert L. Joseph, Jacob P. Kahn, Seymour F. Kaufman, James Kieran, M. Frederick Leeds, Grant Levin, J. Bradley Long, William B. McCreery, Edward A. Macklin, Edward D. McLin, Charles Glenn Malley, Edward Matzger, Charles David Miller, Sidney P. Mitchell, Robert R. Morris, *Antonio Perelli-Minetti, Herbert A. Perkins, Philip Pillsbury, Walter Scott Polland, Edward J. Ringrose, Edward D. Robbins, Hugh S. Robertson, Jr., Raymond Renton Ross, Jonas E. Schreider, William Schweikert, A. Jess Shenson, Charles Albert Shumate, Vernon L. Snowden, Edward F. Stadtherr, Stanley Steinberg, Leyland E. Stevens, Gardner S. Stout, Margaret M. Stuart, Kazuyuki Takahashi, *John M. Thayer, John E. Tobin, Jr., James L. Turner, Walter E. Weber, Charles A. Webster, Jr., Harry A. Wilmer, George T. Wilson, Benjamin H. Wolfman, Clinical Instructors

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* Military leave of absence, 1954–55.

DIVISIONS

Neuropsychiatry
Physical Medicine
Diseases of the Chest
Dermatology and Syphilis

Instruction in the Department of Medicine commences in the fifth quarter of medical registration, at which time the courses in Physical Diagnosis and Clinical Pathology are started. These courses are prerequisite for most other courses in this department.

Before beginning the intern year, students are required: (1) to have completed the prescribed courses, and (2) to have passed a final examination in Internal Medicine, Neurology, and Dermatology.

Deviations from this general plan of work will be permitted only after obtaining permission of the instructors involved and of the Executive Head of the Department of Medicine.

REQUIRED COURSES FOR SECOND-YEAR STUDENTS

201. Introduction to Clinical Medicine.—Preliminary demonstrations and practice in the methods of physical diagnosis followed by bedside work in which abnormal physical findings are correlated with symptoms and laboratory data.

4 hours (88 hours), winter (44) and spring (44) quarters (Lewis, Tinsley, and staff) (San Francisco Hospital) TTh 8:30–10:30

202. Clinical Pathology.—Lectures, and laboratory work. The usual methods of examining the urine, blood, sputum, gastric contents, feces, and cerebrospinal fluid are carried out by the student and the significance of abnormalities is noted.

5 hours (55 hours), winter quarter W 9:30–11:30, F 9:30–12:30
5 hours (55 hours), spring quarter W 9:30–11:30, F 9:30–12:30
(Medical staff) (Room 311)

204. Psychopathology and Psychobiology.

1 hour (11 hours), winter quarter (Shirley and staff) (Room 311) F 8:30–9:30

205. Introduction to Psychiatry.

1 hour (11 hours), spring quarter (Johnson and staff) (Room 311) T 4:30–5:30

REQUIRED COURSES FOR THIRD-YEAR STUDENTS

The third-year class will be divided into three sections. Each section will serve in the Department of Medicine for eleven weeks, the Department of Surgery for eleven weeks, and the Departments of Pediatrics and Obstetrics and Gynecology for five and one-half weeks each.

During the assignment to the San Francisco Hospital, students will attend clinics on tuberculosis and other communicable diseases.

301. Ward Work in General Medicine: Lane Hospital.

(207 hours) (5½ weeks) (Bloomfield and staff)
(autumn, winter, and spring) MTWThFS 8:30–12:30, MTWThF 2:30–5:30

302. Ward Rounds and Ward Work in General Medicine: San Francisco Hospital.

(207 hours) (5½ weeks) (Lewis and staff) (autumn, winter, and spring)
MTWThF 8:30–11:30, S 8:30–12:30, MTWThF 1:30–5:30

303. Set Clinic in Medicine: Lane Hospital.—Required only for students assigned to Lane Hospital.

1 hour (11 hours) (Bloomfield and staff) (Lane Hall) T 1:30–2:30

304. Set Clinic in General Medicine: San Francisco Hospital.

1 hour (22 hours) (Lewis and staff) Th 11:30–12:30

305. Ward Work in Neurology: Lane Hospital.

(Newman) (Same hours as for Medicine 301)

306. Neurology and Psychiatry Clinic: San Francisco Hospital.
1 hour (22 hours) (LUBIN) (all sections) M 11:30–12:30

REQUIRED COURSES FOR FOURTH-YEAR STUDENTS

The fourth-year class will be divided into three sections. Each section will serve in the Department of Medicine for eleven weeks, the Department of Surgery for eleven weeks, and the Departments of Pediatrics and Obstetrics and Gynecology for five and one-half weeks each.

401. Set Clinics in Medicine: Lane Hospital.
1 hour (33 hours), autumn (11), winter (11), and spring (11) quarters (BLOOMFIELD AND STAFF) (Lane Hall) T 1:30–2:30

404. Out-Patient Department, General Medicine and Specialties.
21 hours (231 hours) (11 weeks) MTWThF 9:30–12:30, MWF 2:30–4:30

406. Psychiatry.—Lectures and clinics.
2 hours (66 hours), autumn (22), winter (22), and spring (22) quarters (JOHNSON AND STAFF) (Lane Hall) T 8:30–9:30, S 9:30–10:30

407. Physical Therapeutics.—Lectures and demonstrations.
1 hour (11 hours), winter quarter (NORTHWAY) (Lane Hall) F 8:30–9:30

408. Legal Medicine.
1 hour (11 hours), spring quarter (CATTON) (Lane Hall) M 8:30–9:30

410. Special Topics in Internal Medicine.
1 hour (33 hours), autumn (11), winter (11), and spring (11) quarters (MEDICAL STAFF) (Lane Hall) S 10:30–11:30

411. Dermatology.
1 hour (11 hours), autumn quarter (FARBER) (Lane Hall) M 8:30–9:30

412. Oncology.
1 hour (11 hours), winter quarter (NEWELL) Lane Hall) M 8:30–9:30

ELECTIVE COURSES

1. Ward Rounds in Neurology.—For fourth-year students only. Limited to fifteen.
1 hour (11 hours), autumn quarter (NEWMAN) (Medical Wards) T 3:30–4:30

2. Personality Appraisal in Neuropsychiatry.—Four or more students.
1 hour (11 hours), autumn, and winter quarters (BRADWAY) F 12:30–1:30

3. Water and Electrolyte Disturbances and Treatment.—For fourth-year students only.
1 hour (11 hours), spring quarter (LUETSCHER) (Lane Hall) Th 2:30–3:30

4. Special Demonstrations in Dermatology.—For fourth-year students only.
1 hour (11 hours), spring quarter (FARBER) (Lane Hall) W 4:30–5:30

5. Special Topics in Endocrinology.—For fourth-year students only.
1 hour (11 hours), spring quarter (ROBSON AND STAFF) (Lane Hall) S 8:30–9:30

6. Electrocardiography.—For fourth-year students only.
1 hour (11 hours), winter quarter (RYTAND) (Room 515) Th 4:30–5–30

7. Psychopathology and Psychotherapy.—For fourth-year students.
1 hour (11 hours), spring quarter (CARD, GAW, TILLMAN) (Lane Hall) T 2:30–3:30

8. Systematic Discussion of Important Aspects of Syphilis.—Lectures and demonstrations.
1 hour (11 hours), winter quarter (BARNETT) (Room 515) T 2:30–3:30

9. Medical Economics and Professional Behavior.—For fourth-year students and members of the resident staff who may be interested.
1 hour (11 hours), spring quarter (CHANDLER) (Lane Hall) T 4:30–5:30

10. Renal Diseases and Hypertension.—For fourth-year students only.
1 hour (11 hours), winter quarter (PERSIKE) (Room 515) T 3:30–4:30

11. Clinical Hematology.—For four-year students only.
1 hour (11 hours), winter quarter (HALL) (Lane Hall) S 11:30–12:30

OBSTETRICS AND GYNECOLOGY

LUDWIG AUGUSTUS EMGE, KARL LUDWIG SCHAUPP, HENRY AUGUSTUS STEPHENSON, Clinical Professors Emeriti

WILLIAM EMERSON STEVENS, Associate Clinical Professor Emeritus

CHARLES E. MCLENNAN (Executive), Professor

C. FREDERIC FLUHMANN, Clinical Professor

DONALD W. DECARLE, DONALD A. DALLAS, HANS VONGELDERN, PAUL E. HOFFMANN, Associate Clinical Professors

ROBERT W. NOYES, LYMAN M. STOWE, Assistant Professors

WALLACE DAYTON CLARK, CHESTER LYNN COOLEY, GERTRUDE JONES, HAROLD M. LYONS, KATHLEEN M. MURPHY, FRANK NORRIS, FREDERICK J. NORTHWAY, PENDLETON TOMPKINS, Assistant Clinical Professors

———, Instructor

ROBERT W. DEVOE, RALPH B. DURFEE, WILLIAM A. GORMAN, JOHN OTTO HAMAN, HOWARD HAMMOND, JR., HARRY NORMAN JUROW, WILLIAM KENNETT, JR., AUSTIN W. LEA, ALBERT E. LONG, ROBERT G. DE MAILLY, DOROTHY L. MORSE, JANE SCHAEFER, JOHN B. SCHAUPP, KARL L. SCHAUPP, JR., SEYMOUR P. E. SMITH, HARRY A. SOMERFIELD, JOHN A. SPENCER, Clinical Instructors

PETER KOETS, Research Associate

REQUIRED COURSE FOR SECOND-YEAR STUDENTS

201. Introductory Obstetrics and Gynecology.—Lectures, approximately one-half obstetrics and one-half gynecology.

3 hours (33 hours), spring quarter (DEPARTMENTAL STAFF)
(Room 311) MWF 8:30–9:30

REQUIRED COURSE FOR THIRD-YEAR STUDENTS

302. Ward Rounds and Ward Work: San Francisco Hospital.—Obstetrics and gynecology.

(195 hours) (DEPARTMENTAL STAFF) MTWThF 8:30–11:30, S 8:30–12:30, MTWThF 1:30–5:30

REQUIRED COURSES FOR FOURTH-YEAR STUDENTS

401. Conference in Obstetrics and Gynecology.

1 hour (22 hours), autumn (11) and winter (11) quarters
(DEPARTMENTAL STAFF) (Lane Hall) S 8:30–9:30

403. Obstetrics and Gynecology.—Out-patient clinics; ward work; Lying-in-Suite.

21 hours (105 hours) for 5½ weeks (MCLENNAN AND STAFF)
MTWThF 9:30–12:30, MWF 2:30–4:30

PATHOLOGY

ALVIN JOSEPH COX, JR. (Executive), Professor
WILLIAM HENRY CARNES, LELLAND J. RATHER, Associate Professors
HOUGHTON GIFFORD, Assistant Professor
JOHN B. FRERICHS, Assistant Clinical Professor
JOHN SCOTT CHEREDES, Instructor
MELVIN D. BLACK, CARL A. PETERSON, Clinical Instructors
BLUEBELL R. FORKER, PAULINE HEIZER, Research Associates

REQUIRED COURSE FOR SECOND-YEAR STUDENTS

201. Human Pathology.—The disturbances of function which are associated with vascular, degenerative, inflammatory, and neoplastic changes in tissues are discussed in connection with the study of gross and microscopic preparations. General and special pathological anatomy are both included in this introductory course.

4 hours (44 hours), autumn quarter M 1–5
13 hours (143 hours), winter quarter MS 8:30–11:30, W 8:30–9:30, TTh 1:30–4:30
6 hours (66 hours), spring quarter TTh 1:30–4:30
(DEPARTMENTAL STAFF) (Rooms 311 and 406)

REQUIRED COURSES FOR THIRD-YEAR STUDENTS

301. Clinical Pathological Conference.—Discussion of case histories and morbid anatomy of selected cases coming to autopsy or operation. All sections assigned to Lane Hospital.

1 hour (11 hours)
(STAFF MEMBERS, DEPARTMENTS OF MEDICINE AND PATHOLOGY)
(Lane Hall) W 1:30–2:30

302. Clinical Pathological Conference: San Francisco Hospital.—Discussion of case histories and morbid anatomy of selected cases coming to autopsy or operation.

1 hour (22 hours)
(STAFF MEMBERS, DEPARTMENTS OF MEDICINE AND PATHOLOGY) T 11:30–12:30

303. Pathology of Surgical Diseases.—Given in conjunction with required work in Surgery.

Autumn, winter, and spring quarters (See Surgery 301, page 343)

REQUIRED COURSE FOR FOURTH-YEAR STUDENTS

401. Clinical Pathological Conference.—Discussion of case histories and morbid anatomy of selected cases coming to autopsy or operation.

1 hour (33 hours), autumn (11), winter (11), and spring (11) quarters
(STAFF MEMBERS, DEPARTMENTS OF MEDICINE AND PATHOLOGY)
(Lane Hall) W 1:30–2:30

ELECTIVE COURSES

1. Tumor Conference.—A conference with radiologists and surgeons concerned in care of patients with tumors. Prerequisite: Pathology 201.

1 hour (11 hours), throughout the year (CARNES, DOBSON, KAPLAN, AND STAFFS)
(Lane Hall) Th 4:30–5:30

2. Pathology Research.—For interested students.

(COX AND STAFF, DEPARTMENT OF PATHOLOGY) Hours to be arranged

PEDIATRICS

Harold Kniest Faber, Professor Emeritus
Mary H. Layman, Ann Peril Purdy, Clinical Professors Emeriti
Mary Isabel Preston, Assistant Clinical Professor Emeritus

John Adolph Anderson (Executive), Lloyd Blackwell Dickey, Hale F. Shirley, Professors
Charles W. Leach, James Clifford Parrott, Roland Peter Seitz, Emmy Sylvester, Associate Clinical Professors
Ruth T. Gross, Carolyn Foreman Piel, Edward H. Senz, Assistant Professors
Alvis Joe Scull, Acting Assistant Professor
Landon Haynes Bachman, *Henry Bicker Bruyn, Esther Bridgman Clark, Malcolm H. Finley, Alvin H. Jacobs, Luigi Luzzatti, Agnes Groves Plate, Saul Joel Robinson, Samuel Lloyd Scarlett, Gordon F. Williams, Assistant Clinical Professors
———, ———, Instructors
Hilton B. Atherton, James Ira Ball, Edward G. Bauer, Elizabeth J. Bradley, Richard Deidrich Cutter, Joseph H. Davis, *James H. Flippen, Jr., Randolph G. Flood, Martin Gershman, Moses Grossman, Clarence Edward Havard, John D. Kaster, Grace D. Kleiser, Clarence R. Leininger, Lester A. Luz, Pauline Owyang, William Schweikert, Emanuel Silver, Clinical Instructors
Harold G. Loeb, Research Associate

REQUIRED COURSES FOR SECOND-YEAR STUDENTS

Psychobiology (Medicine 204).—Lectures and class discussions in regard to the dynamics of human behavior, the emotional development of the child, the application of mental health principles to childhood, parent-child relationships, doctor-patient relationships, and the technique of interviewing.

1 hour (11 hours), winter quarter (given jointly by the faculties in the Departments of Medicine and Pediatrics) (Room 311) F 8:30–9:30

201. Introduction to Pediatrics.

1 hour (11 hours), spring quarter (Anderson, Dickey, Alway) (Room 311) M 9:30–10:30

REQUIRED COURSES FOR THIRD-YEAR STUDENTS

302. Ward Work in Pediatrics: San Francisco Hospital.

(214 hours) (5½ weeks) (Anderson and staff)
(autumn, winter, and spring) MTWThF 8:30–11:30, S 8:30–12:30
MTWThF 1:30–5:30

303. Set Clinic in Pediatrics: Lane Hospital.

1 hour (11 hours) (Departmental Staff) (Lane Hall) Th 1:30–2:30

304. Set Clinic in Pediatrics: San Francisco Hospital.

1 hour (22 hours) (Departmental Staff) F 11:30–12:30

REQUIRED COURSES FOR FOURTH-YEAR STUDENTS

401. Set Clinic in Pediatrics: Lane Hospital.

1 hour (33 hours), autumn (11), winter (11), and spring (11) quarters
(Departmental Staff) (Lane Hall) Th 1:30–2:30

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* [illegible] 1954–55.

402. Communicable Diseases in Children.
1 hour (11 hours), autumn quarter (ANDERSON) (Room 311) Th 8:30–9:30

403. Senior Clerkship in Pediatrics.—Senior students assigned to Pediatrics spend five Monday afternoons from 2:30 to 4:30 in the Child Psychiatry Unit during which the following topics are informally discussed: the emotional problems of the mother during pregnancy, the emotional problems during the neonatal period, management of the infant and child, common behavior problems of childhood, psychological tests, psychosomatic problems and interviewing. Case presentations and demonstration interviewing are utilized. For the remainder of the clerkship in Pediatrics the students are assigned to the out-patient and the in-patient service.
(115 hours) (5½ weeks) (DEPARTMENTAL STAFF)
MTWThF 9:30–12:30, MWF 2:30–4:30

404. Pediatric Lectures.
1 hour (11 hours), winter quarter (ANDERSON AND STAFF) (Room 311)
Th 8:30–9:30

ELECTIVE COURSES

1. Research in Pediatrics.—Open to one fourth-year student each quarter who wishes to participate in research activities in the Department.
4 hours (44 hours), autumn, winter, and spring quarters (DEPARTMENTAL STAFF)
(PEDIATRICS DEPARTMENT) TTh 2:30–4:30

2. Biochemical Aspects of Pediatrics.—Limited to six fourth-year students.
1 hour (11 hours), winter quarter (LOEB) Th 2:30–3:30

3. Well Child Clinics.—Open to two fourth-year students each quarter who wish to obtain further experience in well child care encompassing Premature, Well Baby, Well Child, and Adolescent Clinics.
4 hours (44 hours), autumn, winter, and spring quarters (DEPARTMENTAL STAFF)
(PEDIATRIC CLINIC) TTh 2:30–4:30

4. Seminar in Child Guidance.—Limited to six fourth-year students.
2 hours (22 hours), autumn, winter, and spring quarters (SHIRLEY AND STAFF)
By arrangement

5. Out-patient Work in Child Guidance.—Limited to two fourth-year students each quarter. Case work under supervision.
(SHIRLEY AND STAFF) By arrangement

CHILD PSYCHIATRY UNIT

MARY H. LAYMAN, Clinical Professor Emeritus

HALE F. SHIRLEY, Professor of Pediatrics and Psychiatry, Director
KATHERINE P. BRADWAY, Associate Clinical Professor of Psychology
EMMY SYLVESTER, Associate Clinical Professor of Pediatrics
MALCOLM H. FINLEY, Assistant Clinical Professor of Pediatrics
JACOB KAHN, Clinical Instructor in Psychiatry
MARTHA E. CRAWFORD, HELEN C. DELANY, Psychiatric Social Workers
ELIZABETH S. BING, Research Assistant

This special unit was established in October, 1939, and is a joint activity of the Department of Pediatrics and the Division of Neuropsychiatry. Its establishment was made possible by the financial assistance and help of the Commonwealth Fund of New York. The unit conducts a child guidance clinic which functions in co-operation with the pediatric services, both in-patient and out-patient. The purposes of the unit are: (1) to provide instruction concerning the mental health of childhood and the management of emotional and behavior problems of children for undergraduate students, residents in Pediatrics and Neuropsychiatry, nurses and physicians wishing special postgraduate training in the field; (2) to bring, through participation in pediatric activities and through consultation, mental health and child guidance principles into all the pediatric clinical services; (3) to provide a child guidance service for a limited number of children selected for their teaching value. Staff members of the unit take part in pediatric ward rounds and the out-patient clinics.

PHARMACOLOGY AND THERAPEUTICS

Windsor Cooper Cutting (Executive), Professor
Robert Hastings Dreisbach, Associate Professor
Arthur Furst, Associate Professor (Medicinal Chemistry)
Samuel H. Waxler, Associate Clinical Professor
Peter Van Arsdale Lee, Assistant Professor
Ralph Walker Schaffarzick, Assistant Clinical Professor
Jerome Tobias Fishgold, Sumner Myron Kalman, Instructors
Leon Kolb, William C. Kuzell, Walter Edward Naugler, Research Associates

REQUIRED COURSE FOR SECOND-YEAR STUDENTS

201. Pharmacology.—Discussions of the more important local and systemic drugs, including fundamental mechanisms of actions, uses, doses, and symptoms and treatment of poisoning, accompanied by illustrative laboratory exercises. Class will be divided into two sections alphabetically. Section "A" will take the laboratory course on Mondays, 2:30–5:30, and study individually chosen problems on Fridays, 2:30–4:30. Section "B" will take the laboratory course on Fridays, 2:30–5:30, and study individually chosen problems on Mondays, 2:30–4:30.

(187 hours), winter (88) and spring (99) quarters (Cutting, Dreisbach, Fishgold, Furst, Lee, Schaffarzick, Waxler) (Room 515 and Pharmacology Laboratory)
(winter) Lec. TWTh 11:30–12:30; Lab. M 2:30–5:30 and F 2:30–4:30 or F 2:30–5:30 and M 2:30–4:30
(spring) Lec. MTWTh 11:30–12:30; Lab. (see winter quarter)

REQUIRED COURSE FOR THIRD-YEAR STUDENTS

301. Introduction to Therapeutics.—Conferences and discussions on the treatment of medical diseases, with emphasis on the mechanisms of action of drugs. To be taken by groups during quarter assigned to medicine at Lane Hospital and San Francisco Hospital.

1½ hours (15 hours), autumn, winter, and spring quarters (Dreisbach, Fishgold, Lee, Waxler)
Room 515 (Lane Hospital) Th 3–4:30
San Francisco Hospital T 2–3:30

ELECTIVE COURSES

2. Department Conference.—A monthly conference of the department staff, research workers, and other qualified persons for discussion of results and progress of researches and recent advances in pharmacology and therapeutics.

1 hour (monthly) throughout the year By arrangement

3. General Therapeutics.—Fourth-year students may attend Pharmacology 301 as an elective.

(weekly throughout the year) (Cutting, Dreisbach, Schaffarzick)
(Medical Wards and Room 515) Th 3–4:30

4. Medicinal Chemistry.—For fourth-year students only.
1 hour (11 hours), autumn, winter, and spring quarters (FURST)
(Room 515) S 11:30–12:30

505. Research in Pharmacology and Therapeutics.—Open throughout the year to students, graduates, teachers, investigators, and others with satisfactory qualifications.
(STAFF) By arrangement

PHYSIOLOGY

GEORGE DANIEL SHAFER, FRANK WALTER WEYMOUTH, Professors Emeriti

JEFFERSON MARTINEAU CRISMON, JAMES PERCY BAUMBERGER, Professors
FREDERICK A. FUHRMAN, RONALD GRANT, Associate Professors
GEORGE ALEXANDER FEIGEN, Assistant Professor
ALFRED DEAN STOREY, JOSEPH E. WELSH, Lecturers in Physiology

The Department of Physiology is a part of the School of Medicine but maintains close relations with the Department of Biological Sciences. As a department of the School of Medicine it presents required courses in human physiology and certain related elective work. Other courses and research opportunities are designed to meet the needs of students planning to make a career ot physiology or to go into fields in which it is an important adjunct. These interests usually fall into the divisions of general physiology, mammalian physiology, or applied physiology. Appropriate courses of study leading to the degree of Bachelor of Sciences will vary somewhat depending upon the major field of interest and should be determined by consultation with the Department, preferably before completion of Lower Division requirements so that full advantages may be taken of opportunities for elective studies. In general, the requirements and recommendations for students contemplating application for admission to the School of Medicine (see *School of Medicine Bulletin*) may be used as a guide in planning an appropriate course of study.

Advanced Study and Research.—Advanced courses and research are offered to qualified students from other departments. Permission from the instructor should be secured before registration. Students electing physiology as their major field of study in graduate work should consult the *Information Bulletin* where the procedure for admission to graduate standing is outlined. Students whose grade average for graduate courses falls below C+ will be denied further registration as graduate students in physiology.

Advanced Degrees.—All programs leading to an advanced degree in physiology must be worked out individually and approved by the department faculty. In addition to the procedures described in the *Information Bulletin* for admission to candidacy for advanced degrees, graduate students in physiology who plan to work toward a Master of Arts or Doctor of Philosophy degree shall prepare an adequate statement of their proposed research. This statement, in the form of a protothesis, is prepared by the student after consultation with his major professor. Approval of the protothesis by the major professor and one other faculty member of the department is required before formal application for candidacy is permitted. Acceptance of the protothesis will ordinarily be required before the student begins the laboratory work upon which the thesis will be based.

Courses required of all candidates for advanced degrees:

Physiology 153 and 253. Human Physiology
Physiology 200. Introduction to Research in Physiology
*Physiology 201. Colloquium in Physiology
Physiology 210. Techniques in Mammalian Physiology

In addition to the above, all candidates for the degree of Master of Arts ordinarily take any three of the courses in the 300 series. Candidates for the Ph.D. degree will ordinarily take six courses of the 300 series.

COURSES OF INSTRUCTION

90. Elementary Human Physiology.—A survey of human physiology by means of lectures and laboratory exercises, primarily for students in pre-nursing and physical education.
4 units, winter quarter (BAUMBERGER) Lec. MWF 10; Lab. T 1–4

101. Principles of Human Physiology.—An intensive consideration of the physical and chemical bases of mammalian physiology with special emphasis upon the mechanisms of neuromuscular action, integration by the central nervous system, cardiovascular function, excretion, respiration and energy exchange. Open to qualified students including majors in biology, pre-medicine, physical therapy, biochemistry, bacteriology, psychology and physical sciences. Prerequisites: completion of one year each of college chemistry and college biology with a passing grade (Chemistry 1, 2, and 3, and Biology 1, 2, and 3 at Stanford or the equivalent). College courses in physics or mathematics may be substituted in lieu of two of the quarters of chemistry. Physiology 90 may not be substituted for the above prerequisites.
5 units, autumn quarter (FEIGEN) Lec. MWF 9; Lab. MW 1–4

113. Physiology of Adaptation.—A consideration of the physiological responses of man to changes in his environment. Subjects discussed include muscular exercise, heat, cold, altitude, nutritional problems, and high pressure. Prerequisites: Physiology 101 or equivalent. Adequately prepared advanced students lacking this prerequisite may be admitted with the permission of the instructor. (Physiology 90 is not acceptable as a substitute for Physiology 101.)
3 units, spring quarter (FUHRMAN) MTTh 9

153. Human Physiology.—(Two quarters; see also Course 253.) A systematic and detailed survey by means of lectures, conferences, and laboratory exercises of mammalian physiology with particular emphasis on man. The topics considered include circulation, blood, metabolism, temperature regulation, water distribution, renal function, peripheral and central nervous systems, receptors, muscle, external respiration, digestion, nutrition, hormones, and reproduction.
8 units, spring quarter (CRISMON, BAUMBERGER, FEIGEN, FUHRMAN, GRANT)
Lec. MTWTh 8; Lab. WF 9–12 and 1–4

167. Undergraduate Problems.—**Advanced exercises in physiology for undergraduates.**
Any quarter (DEPARTMENT FACULTY) By arrangement

191. History of the Biological Sciences.—A lecture and reading course. Primarily for graduate and advanced undergraduate students. (Same as Biology 191.)
3 units, spring quarter (BAUMBERGER) By arrangement

192. Special Problems in the History of the Biological Sciences.—Prerequisite: Biology 191, or equivalent. (Same as Biology 192.)
Autumn, winter, and spring quarters (BAUMBERGER) By arrangement

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* All graduate students in physiology are expected to register for this course winter and spring quarters.

200. Introduction to Research in Physiology.—An introduction to the basic techniques of research in physiology, including the preparation of theses. Required of all candidates for advanced degrees.
2 units, autumn quarter (Department Faculty) T 4

201. Colloquium in Physiology.—Reports on current literature with presentation and discussion by graduate students and faculty. Required of all graduate students in physiology.
1 unit, winter and spring quarters (Department Faculty) T 4

205. Physiology for Psychologists.—A consideration of physiological changes in normal human beings and in those with psychosomatic disorders associated with psychological activities such as emotion. Lectures and laboratory demonstrations. Open to all Upper Division and graduate students with suitable background and interests, as determined by consultation with the instructor.
3 units, winter quarter (Grant) [Not given in 1954–55]

207. Research.—An advanced course open to graduate students who have had one or more Upper Division courses in physiology. Designed to afford opportunity for the further study of selected subjects in physiology or the writing of theses. The work is planned for the individual student
Any quarter (Department Faculty) By arrangement

210. Techniques in Mammalian Physiology.—Laboratory demonstration and practice in techniques of measurement on mammals. Standard methods of recording arterial pressure, respiration, oxygen consumption, etc., and the combined use of such methods in specific assigned problems. Limited to twelve students. Required of all candidates for advanced degrees.
3 units, winter quarter (Grant) Lec. and Lab. by arrangement

215. Physiological Applications.—A consideration of the physiological disturbances in various diseases. Primarily for second-year medical students.
1 unit, autumn quarter (Crismon and staff) F 8

253. Human Physiology.—A continuation of Physiology 153.
6 units, autumn quarter (Crismon and staff) Lec. MTWTh 8; Lab. TTh 1–4

262. General Physiology.—The study of certain of the fundamental principles of physiology by accurate quantitative methods. Several widely different topics are intensively studied in the laboratory and these are developed and correlated in informal lectures. Prerequisite: training in chemistry, physics, and biology, or physiology. Consult instructor as to adequacy of preparation.
5 units, autumn quarter (Baumberger) Lec. MWF 10; Lab. by arrangement

264. Applied Physiology.—(Research.) Prerequisite: consult instructor.
3 or more units, any quarter (Baumberger) By arrangement

ADVANCED COURSES FOR GRADUATE STUDENTS

[Courses 301 to 307 are open to postgraduate students in medicine and to qualified graduate students from other departments by arrangement.]

301. Physiology of Water and Electrolytes.—Metabolism of water and electrolytes especially in mammals. A detailed consideration of mechanisms of water and electrolyte economy and distribution.
2 units, autumn quarter (Crismon) [Not given in 1954–55]

302. Circulation and Related Topics.—An advanced consideration of selected topics in the physiology of the circulation and its relations to metabolism, temperature regulation, respiration, and the like. Lectures and discussions.
2 units, winter quarter (———) [Not given in 1954–55]

303. Advanced General Physiology.—The interpretation of physiological phenomena in terms of physical chemistry. Appropriate topics as, for example, oxidation-reduction, hydrogen ion concentration, colligative properties,

diffusion, conduction, and energy transformations will receive special emphasis. Potentiometric, polarographic, spectrophotometric, calorimetric, and manometric methods will be discussed. Lectures and demonstrations.
2 units, spring quarter (BAUMBERGER) [Not given in 1954–55]

304. Metabolism of Tissues.—Metabolism of mammalian tissues and organs including a survey of the fundamental mechanisms of action of hormones and other physiologically active compounds. Special methods will be considered.
2 units, autumn quarter (FUHRMAN) M 1–3

305. Physiology of the Central Nervous System.—Recent progress in knowledge regarding the vertebrate central nervous system, especially the brain system and spinal cord of mammals. Modern electrophysiological and other investigative techniques will be discussed and demonstrated.
2 units, winter quarter (GRANT) M 1–3

306. Current Problems in Muscle Physiology.—A discussion of selected biophysical, pharmacological, and immunological aspects of muscular contraction; an evaluation of modern theories of contractility.
2 units, spring quarter (FEIGEN) M 1–3

307. Applied Physiology.—Advanced discussions on the adjustment of man to environmental extremes. Prerequisite: graduate students from departments other than physiology consult instructor.
2 units, autumn or spring quarter (replaces Courses 302 or 303 in alternate years) (BAUMBERGER) [Not given in 1954–55]

PUBLIC HEALTH AND PREVENTIVE MEDICINE

RODNEY RAU BEARD (Executive), Professor
ELLIS D. SOX, Clinical Professor
CHARLES REDFIELD GARDIPEE, JR., Assistant Professor
LINCOLN E. MOSES, Assistant Professor of Statistics
DAVID DUNCAN HOLADAY, Clinical Instructor
ARTHUR C. LADD, LOUIS OLSEN, Lecturers

REQUIRED COURSES FOR SECOND-YEAR STUDENTS

201. Community Health.—An introduction to health problems engendered by community life and organized services designed to deal with them.
1 hour (11 hours), autumn quarter (BEARD) F 1–2

202. Community Health.—Maternal, infant, preschool, school, adult, and industrial hygiene and preventive medicine in the light of social needs and present trends.
1 hour (11 hours), spring quarter (STAFF, in co-operation with Departments of Pediatrics and Obstetrics and Gynecology) F 1:30–2:30

203. Environmental Hygiene.—Sanitation of water, foods, and air and the agencies through which it is accomplished.
1 hour (11 hours), winter quarter (GARDIPEE, BEARD) (Room 311) F 1:30–2:30

REQUIRED COURSES FOR FOURTH-YEAR STUDENTS

401. Field Work and Laboratory Exercises.—Supervised visits to various activities where preventive medical principles and public health practices are demonstrated. Fourth-year students assigned to surgical section.
4 hours (44 hours), autumn, winter, and spring quarters (BEARD AND STAFF) (Lane Hall) W 8:30–12:30

402. Epidemiology and Control of Communicable Diseases.—Lectures, assigned reading, and problems in communicable-disease control.
2 hours (22 hours), autumn quarter (Gardipee) (Room 311) TF 4:30–5:30

403. The Patient in His Environment.—Presentation by the students of patients seen in the various out-patient dispensaries and studied in their homes.
2 hours (22 hours), spring quarter (Beard and staff)
(Room 311) MF 4:30–5:30

404. Occupational Health.—Occupational diseases, the principles of their control, the conservation of health and efficiency in industry, and their relationship to private medical practice.
2 hours (22 hours), winter quarter (Beard, Holaday, and staff)
(Room 311) TF 4:30–5:30

ELECTIVE COURSE

1. Research in Public Health and Preventive Medicine.—For interested students.
(Staff) By arrangement

2. Biostatistical Methods.
(Moses) By arrangement

RADIOLOGY

†Henry Seymour Kaplan (Executive), Professor
Leo Henry Garland, Clinical Professor
Dan Tucker, Associate Clinical Professor
Herbert L. Abrams, Henry Howard Jones, Assistant Professors
Mitchel Weissbluth, Assistant Professor (Radiologic Physics)
Russell W. Bernhard, Henry P. Brean, George T. A. LeClerq, J. Maurice Robinson, William W. Saunders, Merrell Sisson, Sydney F. Thomas, Assistant Clinical Professors
William L. Anderson, *Gerhard L. Hencky, Bernard M. Stone, Instructors
Klaus R. Dehlinger, Charles Edward Duisenberg, Howard L. Jones, Bernard Kordan, Martha Mottram, William H. Thompson, Clinical Instructors
Norman Delfel, C. Susan Nagareda, Research Associates

REQUIRED COURSE FOR SECOND-YEAR STUDENTS

201. Radiology.—Lectures and section work.
1 hour (11 hours), spring quarter (Anderson and staff)
(Lane Hall) M 10:30–11:30

REQUIRED COURSE FOR THIRD-YEAR STUDENTS

301. Clinical Radiological Conference.—For students assigned to Lane Hospital.
1 hour (11 hours) (Staff) (Lane Hall) M 1:30–2:30

REQUIRED COURSE FOR FOURTH-YEAR STUDENTS

401. Clinical Radiological Conference.—Lane Hospital.
1 hour (33 hours), autumn (11), winter (11), spring (11) quarters
(Staff) (Lane Hall) M 1:30–2:30

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* Military leave, 1954–55.
† Leave of absence, 1954–55.

ELECTIVE COURSES

1. Diagnostic Radiology. — For fourth-year students only. Limited to twelve students per quarter.
4 hours, autumn (44), winter (44), and spring (44) quarters (JONES AND STAFF)
(Radiology Seminar Room) TTh 2:30–4:30

2. Radiation Therapy.—For fourth-year students. Limited to eight students per quarter.
[Not given in 1954–55]

3. Research in Radiology.—For interested students.
(STAFF) (Department of Radiology Research Laboratory) Hours to be arranged

5. Clinical Radiology Conference.—For third-year students assigned to San Francisco Hospital.
1 hour (22 hours) (GARLAND AND STAFF) W 12:30–1:30

SURGERY

HANS BARKAN, JAMES R. DILLON, LEO ELOESSER, ARTHUR LAWRENCE FISHER, EDWARD CECIL SEWALL, Clinical Professors Emeriti
SYLVAN L. HAAS, ROBERT S. IRVINE, LEWIS MICHELSON, EDWARD B. TOWNE, Associate Clinical Professors Emeriti
GEORGE WASHINGTON HARTMAN, Assistant Clinical Professor Emeritus
OTTO BARKAN, EDMUND BUTLER, Lecturers Emeriti

EMILE FREDERIC HOLMAN (Executive), LOREN ROSCOE CHANDLER, DONALD ELIOT KING, CARLETON MATHEWSON, JR., ALFRED EDWARD MAUMENEE, FREDERICK LEET REICHERT, Professors
SIGURD VON CHRISTIERSON, FRANCIS J. COX, ALBERT DAVID DAVIS, LEONARD G. DOBSON, ROBERT C. MCNAUGHT, EDMUND J. MORRISSEY, GUNTHER W. NAGEL, DOHRMANN K. PISCHEL, WILLIAM LISTER ROGERS, ROBERT SCARBOROUGH, HENRY M. WEYRAUCH, Clinical Professors
ROY BARNETT COHN, FRANK LEVIN ALBERT GERBODE, VICTOR RICHARDS, Associate Professors
PHILIP J. BAILEY, JEROME W. BETTMAN, JOHN WESLEY CLINE, CLARENCE BERT COWAN, FREDERICK A. FENDER, MAX FINE, WILLIAM WALLACE GREENE, BERT LEWIS HALTER, LOT D. HOWARD, JR., NELSON J. HOWARD, FRANK W. LUSIGNAN, MERRILL C. MENSOR, JOHN J. NIEBAUER, JAMES OWNBY, JR., AUBREY G. RAWLINS, PAUL C. SAMSON, LEE SHAHINIAN, WILLIAM A. SUMNER, ROBERT PRESTON WATKINS, Associate Clinical Professors
———, Assistant Professor
EMELIE ANDERSON (MRS. FLOYD DEEDS), BRUCE M. ANDERSON, SHIRLEY HAROLD BARON, JOHN DENNIS BLAIR, WILLIAM E. BORLEY, CHARLES E. COOPER, ALBERT C. DANIELS, ERNEST W. DENICKE, EDMUND P. GAYNOR, RUFUS C. GOODWIN, AVERY M. HICKS, H. SPENCER HOYT, ARTHUR JAMPOLSKY, PHILLIPS JOHNSON, AUGUST FREDERICK JONAS, JR., RUSSELL R. KLEIN, EARLE H. MCBAIN, PAUL J. MOSES, DONALD R. PRATT, EMMETT LANE RIXFORD, MIRIAM RUTHERFORD, FREDERIC SHIDLER, GEORGE L. TORASSA, JR., WILLIAM BYRON WALLACE, PHILIP R. WESTDAHL, WALTER P. WORK, Assistant Clinical Professors

WALTER E. HECK, MILTON LOUIS ROSENBERG, Instructors

MILTON A. ANTIPA, JUAN F. AYCINENA, ELDRED WORDEN BARNES, J. BRANDON BASSETT, WILLIAM F. BAXTER, ARMAND LOUIS BENGLE, JR., EDWIN G. BOVILL, JR., CONSTANTINE R. BRICCA, JR., ALBERT J. BRINCKERHOFF, E. HOMER BRUGGE, LUCIUS L. BUTTON, JOHN EDWARD CANN, COLEMAN CITRET, ROBERT H. CLARKE, BAYARD H. COLYEAR, THOMAS F. CONROY, JOHN F. COWAN, GLEN O. CROSS, WILLIAM E. CUNHA, COOPER DAVIS, EDWARD W. DOHERTY, DAVID J. DUGAN, SAMUEL ENGEL, JOHN ERSKINE, GERALD MASON FEIGEN, DONALD M. GALLAGHER, ERNEST GIANOTTI, JAMES L. GOEBEL, RICHARD I. GONZALEZ, CHARLES STANTON HARROD, MELVIN T. HURLEY, HEINRICH W. KOHLMOOS, CHARLES PHILIP LEBO, GEORGE QUAN LEE, GEORGE WILLIAM MAGLADRY, VERNON J. MAINO, GERALD S. MARGULIES, ROBIN P. MICHELSON, ALBERT G. MILLER, ROBERT L. MILLS, WILLIAM A. NEWSOM, FRANK J. NOVAK, ALFRED M. PALMER, ROBERT S. POLLACK, JOSEPH C. PRESTI, JOHN W. RATCLIFFE, JOHN R. RAYMOND, LEONARD D. ROSENMAN, MAURICE S. SALOMON, JEAN ALBERT SARRAIL, CHARLES M. SECOR, RICHARD A. SHEPARD, FRANK A. SPENCER, AUGUST SPITALNY, THOMAS C. STEVENSON, EDWARD TAMLER, CALVIN K. TERWILLIGER, HENRY W. TURKEL, PIETER A. DE VRIES, CHARLES C. WYCOFF, BRADFORD YOUNG, JEROME F. ZOBEL, Clinical Instructors

REA ERNEST ASHLEY, CARL E. BURKLAND, ROBERT WINSTON CHURCHILL, DELBERT HAND, HARRY P. HOWARD, GEORGE S. LACHMAN, J. MINTON MEHERIN, *WILLIAM B. NEFF, FRANK H. RODIN, BLAKE C. WILBUR, Lecturers

DIVISIONS

Ophthalmology
Genito-Urinary Diseases
Bone and Joint Surgery
Anesthesiology
Otorhinolaryngology

GENERAL PLAN OF INSTRUCTION

Instruction in surgery in the fifth and sixth quarters is intended, by recitations and discussions on assigned reading, to acquaint the student with the principles of surgery. Elementary instruction in the physical diagnosis of surgical conditions is included in the course given by the Department of Medicine. Two lectures on anesthesia are included in the course.

The laboratory course in the fifth and sixth quarters will include operations in which surgical procedures are performed on living animals under complete ether anesthesia, and under exactly the same conditions that prevail in the modern operating room, particular attention being paid to asepsis, hemostasis, and the healing of wounds. Demonstrations and practice in the use of bandages, plaster, and surgical appliances will be provided.

In the third year the students will serve in the surgical wards of the Lane and San Francisco Hospitals as clinical clerks for a period of five weeks in each hospital. The student will be an integral member of the surgical house staff, spending his time on the wards and in the operating rooms. Ward rounds will be held daily at 8:30 covering the fields of general surgery, orthopedics, and urology. The patients entering the hospitals on these services will be assigned to the student in rotation, and the student will be held responsible for a complete history, a complete physical examination under the supervision of the intern, and for the routine laboratory work such as the analysis of urine, blood, sputum, and feces. The student will be responsible

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* Military leave, 1954–55.

Classes are admitted to the School of Nursing each year at the beginning of the autumn quarter and at the beginning of the spring quarter if there are sufficient applicants. General information and the detailed requirements and procedure for gaining admission are given in the *Annual Announcement of the School of Nursing.* This bulletin should be obtained by every student contemplating entrance.

Requests for information and application blanks should be addressed to the Office of Admissions, Stanford University, Stanford, California.

COURSES OFFERED BY THE SCHOOL OF NURSING

100. History of Nursing.
1 unit, first year, first term (Conroy)

101. Nursing Arts.
8 units, first year, first term (Eriksen and assistants)

104. Professional Adjustments I.
1 unit, first year, first term (Conroy)

105. Professional Adjustments II.
1½ units, third year (Ringressy)

120. Nutrition.
1½ units, first year, first term (Pratt)

121. Diet in Disease.
2½ units, first, second, or third year (Pratt)

122. Practice in Diet Therapy.
1 unit, first year (Members of the dietary staff)

131. Introduction to Pharmacology.
2 units, first year, first term (Eriksen)

132. Pharmacology and Therapeutics.
2 units, first year, first term (Cutting, Lee, Ritter)

133a, b, c. Medical Diseases and Nursing.
5 units, first year (Rodgers, Ritter)

134. Practice in Medical Nursing.
4 units (including Course 135), first, second or third year (Ritter and assistants)

135. Medical Clinic.
2 weeks, first year (Elwood and assistants)

136a, b, c. Surgical Diseases and Nursing.
5 units, first year (Chase, Lawrence)

137. Practice in Surgical Nursing.
4 units (including Course 138), first, second or third year (Lawrence and assistants)

138. Surgical Clinic.
2 weeks, first or second year (Elwood and assistants)

139. Bone and Joint Diseases and Nursing.
1 unit, first year (Watkins, Lawrence)

140a, b. Gynecology and Gynecological Nursing.
1 unit, first year (Lyons, Denhard)

143. Ophthalmology and Nursing.
½ unit, first year, second term (Brugge, Lawrence)

144. Diseases of the Ear, Nose, and Throat, and Nursing.
½ unit, first year (Heck, Lawrence)

145. Genito-Urinary Diseases and Nursing.
½ unit, first year (Ownby, Lawrence)

146. Principles of Operating Room Technique.
½ unit, first or second year (Howard, Mori)

147. Practice in Operating Room Technique.
2 units, first or second year (Mori, McConnell)

150a, b. Obstetrics and Obstetric Nursing.
3 units, second or third year (Gratton, Denhard)

151. Practice in Obstetric Nursing.
3 units (including Course 152), second or third year (Denhard and assistants)

152. Obstetric Clinic.
2 weeks, second or third year (Elwood and assistants)

160. Child Development.
1 unit, first year (Shirley and assistants)

161. Practice in Nursery School.
½ unit, first or second year (Kellogg and assistants)

162a, b. Pediatrics and Pediatric Nursing.
2 units, second or third year (Senz, Hood)

163. Practice in Pediatric Nursing.
3 units (including Course 164), second or third year (Hood and assistants)

164. Pediatric Clinic.
2 weeks, second or third year (Elwood and assistants)

170. Neurology.
½ unit, first year, second term (Palmer, McDonald)

171a, b. Psychiatry and Psychiatric Nursing.
3 units, first, second or third year (Hamilton, McDonald)

172. Practice in Psychiatric Nursing.
3 units, first, second or third year (McDonald and assistants)

182. Dynamics of Human Relationships.
2 units, second year (Hawes and assistants)

183. Community Organizations for Disease Control.
3 units, second year (Gardipee)

184. Public Health Nursing.
3 units, second or third year (Hawes and Special Lecturers)

185a. Communicable Diseases and Nursing.
2 units, second year (Luz, Patek, Hood)

185b. Dermatology and Nursing.
1 unit, first year (Farber, Shumate, Ritter)

187. Practice in Communicable Disease Nursing.
1 unit, second year (Arnaud and assistants)

189. Community Nursing.
2 units, third year (Burcham and staff)

191. Practice in Convalescent Care of Children.
½ unit, third year (Atwood and assistants)

193. The Role of the Public Health Nurse in Community Health and Social Agencies.
1 unit, second year (Hawes and assistants)

194. Practice in Private Patient Care.
1 unit, first, second, or third year (Morgan and assistants)

PREDENTAL CURRICULUM

Stanford University does not provide in its organization a School of Dentistry. It does, however, offer courses which, when satisfactorily completed, fulfill the predental requirements necessary for admission to dental schools of the United States.

The Council on Dental Education has fixed as the minimum basis for admission to an approved dental school the successful completion of two full academic years of work in an accredited college of liberal arts and science. The college course must include at least a year's credit in English, in biology, in physics, and in inorganic chemistry, and a half year's credit in organic chemistry. All courses in science should include both class and laboratory instruction.

Students in this University who wish to complete predental requirements in a two-year program while also fulfilling the Lower Division requirements should consult their Lower Division adviser for suggested arrangements of courses. (For predental requirements in biology see page 118.)

MEMORIAL CHURCH

THE REV. ROBERT M. MINTO, Chaplain of the University
HAROLD C. SCHMIDT, Director of the Memorial Church Choir
HERBERT B. NANNEY, University Organist

The religious life of the University centers in the Memorial Church, situated appropriately at the heart of the University in the inner quadrangle, with the imposing façade decorated with a large mosaic of the Sermon on the Mount. Founded as a memorial to Governor Stanford by Mrs. Jane Lathrop Stanford, the church was dedicated in 1903. It is noted for its architecture and ornament, the Venetian mosaics being a special feature of its interior.

Through its ministry and services the Memorial Church seeks to serve the whole University community irrespective of denomination. As the University's church it aims to express and promote religious unity and co-operation. Linked to historic Christianity by its ministry and sacraments, the Church maintains in its services the great common principles of Christian worship.

Through the Church, opportunities are offered for student planning and direction of religious activity such as discussion groups, Bible study groups, vesper services, and participation in the various worship services of the Church by singing in the choir, ushering, or reading the lessons. Students are encouraged to take a full part in all phases of church life, their personal help and suggestions being always welcome. The purpose of the Church is to serve the whole campus, not only in general religious activity, but also in the needs of the individual. Through religious counseling the Chaplain seeks to help those in need of spiritual help and direction.

Each Sunday morning at 11:00 a service of worship is held for the whole University. The service is nonsectarian in character and all students should feel free to attend the University Church whatever their religious affiliation may be. Visiting ministers from various denominations preach in the Memorial Church from time to time.

CHURCH SERVICES

Sunday: Divine worship and Sermon, 11:00 A.M.
Church School meets during the church hour.
Holy Communion is celebrated on the first Sunday of the month at 9:00 A.M.
Wednesday: Candlelight Service, 9:00 P.M.

ORGAN RECITALS

Each Thursday at 4:15 P.M. throughout the year.
Sunday recitals as announced.

The Chaplain's office and church library are in the Vestry at the rear of the church.

MILITARY SCIENCE AND TACTICS

PETER J. KOPCSAK, Colonel, Artillery, Professor
WILLIAM L. WHITSETT, Lieutenant Colonel, Quartermaster Corps, Assistant Professor
HENRY B. GLAISTER, Lieutenant Colonel, Artillery, Acting Assistant Professor
DONALD F. BECK, Captain, Artillery, Acting Assistant Professor
WILLIAM P. HILL, Captain, Artillery, Assistant Professor
LEE B. MOORE, 1st Lieutenant, Quartermaster Corps, Assistant Professor

Courses in Military Science and Tactics follow the University numbering pattern: courses numbered from 1 to 99 inclusive are for Lower Division, and from 100 to 199 inclusive for Upper Division. In the Army ROTC program the courses are numbered so that the units digit indicates the quarter in which the subject is given and the tens digit indicates the respective year of the four-year ROTC course, i.e., Course number 142 represents an Upper Division course, given in the 4th year enrollment in Army ROTC, during the 2nd Quarter or Winter Quarter of the academic year.

SUMMER QUARTER

The Army ROTC offers no Summer Quarter courses at the University. Students who successfully complete MS III will attend a Branch General Summer Camp immediately after completion of MS III. The student receives travel expenses to and from the summer camp and further receives an allowance of $78.00 per month during attendance at the summer camp.

General.—On 19 June 1953 the Secretary of the Army approved a request from the President of Stanford University to convert the ROTC program at Stanford University to a General Military Science curriculum commencing in academic year 1953–54.

This new program stresses such subjects as Army history, organization and mission, military personnel management, operations, tactics and techniques, logistics and materiel, and above all is pointed toward developing leadership ability. The purpose is to provide a general type of training to produce officers who may serve in any branch of the Army after further training in that branch.

After completion of the four-year General Military Science course, and upon being commissioned, the officer will be assigned to a service school for training in the branch to which he has been assigned.

During the entire course ROTC cadets will be constantly observed to determine their all-around qualifications for military leadership and to insure that they are physically fit to carry the responsibilities of military leaders. Students will attend a Branch General Summer Camp on successful comple-ion of MS III. At summer camp, tentatively designated to be Fort Lewis, Washington, students will receive instruction in the use of Infantry weapons; tudy of maps and aerial photographs; practical training in construction of asty field fortifications; signal communications; motor movements; gunnery; aining in offensive and defensive tactics; and leading small units in combat. eadership in all its aspects will be stressed during this period.

Objective.—The general objective of the course of instruction is to produce nior officers who by their education, training, and inherent qualities are itable for continued development as officers in the United States Army. struction will be given in subjects common to all branches of the Army.

Upon graduation and the successful completion of the Army ROTC course student may be commissioned a 2d Lieutenant in the United States Army

Reserve. Outstanding graduates may be offered direct commission in the Regular Army.

Commissioning.—As long as draft calls continue, all ROTC graduates who are commissioned and thus removed from liability for induction must be called to active duty as officers. This, of course, is further complicated by the needs of the active army being far less than the capability of the ROTC program to produce commissioned officers.

In view of this, Department of the Army has announced the following policies:

1. Every effort will be made to commission and call to active duty all Army ROTC graduates in the class of '54. They will be assigned primarily to branches in which they received their specialized training at summer camp.

2. A quota of 110 students will be carried in the MS III program at Stanford University. These students will be primarily qualified graduates of the Army Basic ROTC course. The number of students in MS III who will receive commissions upon graduation will depend upon the situation at the time of graduation with respect to the needs of the active army. There is a possibility that all graduates in the class of 1955 may not receive commissions with the excess being given certificates of completion of the course.

3. Branch assignments for the class of 1955 and subsequent classes will be in accordance with individual capabilities, training, preference, and primary consideration being given to the needs of the service. All of these graduates must be prepared to accept commissions and serve in any branch where needed.

Deferment.—Under the provisions of Public Law 51, 82d Congress (Universal Military Training and Service Act) selected students of the Army ROTC program may be granted deferments from selective service induction. Those selected will sign an agreement to accept a commission as an officer of the United States Army Reserve, if tendered; and to serve as such on active duty for a period of not less than two years if called; and to remain a member of the service in a reserve status for a total period of eight years. Selection is limited to quotas allotted to Stanford by the U.S. Army.

Those students who satisfactorily complete the Basic Course are considered by a board of officers for selection to enroll in the advanced course. Enrollment in the advanced course is again limited by quota. Deferment is automatically extended for students who are selected.

Selection for the advanced course is highly competitive and only those cadets who are above average in leadership qualities can feel assurance of continued enrollment. Deferment must be cancelled immediately upon withdrawal or discharge from the program for any cause during either the basic or the advanced course.

Enrollment in the Basic Course.—Courses are open only to citizens of the United States who meet certain physical requirements. Arrangements for physical examination may be made with the University Health Service.

Conditions for enrollment, except for veterans, are as follows:

1. Be selected, within assigned quotas, by the PMS&T.
2. Be not less than 14 years of age nor more than 23.
3. Have at least 12 quarters (exclusive of summer work) remaining at time of enrollment.

Paramount criterion is that every enrolled cadet has the potential of becoming an effective Army officer. Classification tests will be given periodically to test the progress of cadets but principal reliance for selection and retention in the program will be placed on the judgement of the Professor of Military Science and Tactics and his assistants.

Within budgetary limitations, it is the intention of the Department of the Army to authorize the enrollment of all qualified applicants for MS I.

Basic Course.—Three hours per week

MILITARY SCIENCE I (first year) (90 hours)

1. Provides an understanding of the organization of the Army and an orientation on ROTC.
2. Provides a sound foundation in the principles of the art of warfare as they are exemplified in American Military History, and through this knowledge to aid the student toward an understanding and acceptance of his future role as an officer of the U.S. Army.
3. Provides a practical working knowledge of individual weapons presently used in the Army and is aimed to make the student proficient in the conduct of marksmanship and enable him to coach others correctly.
4. Provides leadership training, drill experience, and develops certain essential characteristics of leadership as initiative and self-confidence, through progressive training in the school of the soldier and exercise of command. Further provides indoctrination in military courtesy and customs of the service.

MILITARY SCIENCE II (second year) (90 hours)

1. Provides familiarization with all types of infantry crew-served weapons in use by the Army. Further provides a knowledge of fire power, gunnery, and control of fire.
2. Provides instruction in the use of maps, and aerial photographs to include terrain evaluation, topographic symbols, resection, and classes of aerial photography and methods of obtaining same.
3. Continues leadership training commenced in MS I.

Enrollment in Advanced Course.—Eligibility for enrollment in the advanced course is based on satisfactory completion of the basic course or on credit granted for previous military training. In addition, the student must:

1. Be selected, within assigned quotas, to pursue the advanced course by the Professor of Military Science and Tactics and the President of the University.
2. Be a citizen of the United States.
3. Not have reached 27 years of age.
4. Agree in writing to complete the Army ROTC University program and the prescribed summer camp contingent upon his remaining in college.
5. Be accepted by the university as a regularly enrolled student.
6. Be physically qualified under standards prescribed.
7. Have at least 6 quarters (exclusive of summer work) remaining at time of enrollment.

Advanced Course.—Five hours per week

MILITARY SCIENCE III (third year) (150 hours)

1. Provides students with the principles and fundamentals of small unit tactics, to prepare him for advanced tactical studies and the principles of communications and communication systems.
2. Provides familiarization with the organization, function, and mission of the various arms and services in the over-all mission of the Army.
3. Develops an understanding of the principles, methods, and techniques which are fundamental to military instruction and provides opportunity to develop skill in the preparation, presentation, and evaluation of instruction.
4. Continues leadership training.

MILITARY SCIENCE IV (fourth year) (150 hours)

1. Provides fundamental knowledge of supply and movement of small units.
2. Provides an understanding of staff organization, staff duties, records and orders; an understanding of military intelligence; and co-ordination with Air and Navy.
3. Provides the student with basic concepts of military administration and personnel management, and fundamental concepts of military justice.
4. Prepares the future officer for active service by an orientation on geographical and economic factors, their influence on the division of peoples into nations, and the courses of war; the responsibilities of a leader; service life.
5. Continues leadership training.

Transfer of Students Between Services.—In selecting students to fill enrollment quotas, PMS&T's will give preference to graduates of the Army ROTC basic course. Transfer of Air Force students from Air Science I to Military Science II and from Air Science II to Military Science III will be held to an absolute minimum. Transfer of students who have completed AS III to MS IV will not be authorized except at institutions which would otherwise fail to meet their minimum quota of 25 commissioned army officers. Former Air Force students transferred under this authority will be limited to individuals who are specially qualified, highly motivated, volunteer for the combat arms including Engineer and Signal Corps, and preferably, who are pursuing courses leading to an engineering degree.

Emoluments, Uniforms, and Texts.—A monetary allowance of approximately $27 per month for the last two years of the course is made to students in good standing. Uniforms and texts are supplied without cost to the student for use while enrolled in the course. Students discharged for reasons other than for the convenience of the government must refund monetary allowances paid to them.

Credits.—Military Science courses are accepted in lieu of Lower Division physical education requirements. They also may be offered in part satisfaction of Lower Division Group II requirements.

Distinguished Military Students.—Under the provisions of federal law, advanced students who are outstanding both academically and in leadership, in military courses and in campus activities are designated Distinguished Military students upon selection by a board of officers. Upon concurrent recommendation of the PMS&T and the President of the University students may be designated as Distinguished Graduates upon graduation. The latter are eligible to apply for commissions in the Regular Army.

Days and Hours of Instruction.—Announcement of days and hours for the following courses will be found in the *Time Schedule* each quarter:

FIRST-YEAR COURSES

11. Organization of the Army and American Military History.
2 units, autumn quarter.

12. American Military History and Individual Weapons.
2 units, winter quarter.

13. Marksmanship and School of the Soldier.
2 units, spring quarter.

SECOND-YEAR COURSES

21. Crew-Served Weapons and Gunnery.
2 units, autumn quarter.

22. Gunnery and Map Reading.
2 units, winter quarter.

23. Map Reading and School of the Soldier.
2 units, spring quarter.

THIRD-YEAR COURSES

131. Small Unit Tactics and Communications.
4 units, autumn quarter.

132. Small Unit Tactics and Organization, Functions and Missions of the Arms and Services.
4 units, winter quarter.

133. Military Teaching Methods, Leadership and Exercise of Command.
4 units, spring quarter.

FOURTH-YEAR COURSES

141. Logistics and Operations.
4 units, autumn quarter.

142. Operations and Personnel Management.
4 units, winter quarter.

143. Personnel Management, Service Orientation, and Exercise of Command.
4 units, spring quarter.

SCHOOL OF MINERAL SCIENCES

ELIOT BLACKWELDER, AUSTIN FLINT ROGERS, Professors of Geology, Emeriti
WELTON JOSEPH CROOK, Professor of Metallurgy, Emeritus
THEODORE JESSE HOOVER, Professor of Mining Engineering, Emeritus
FREDERICK GEORGE TICKELL, Professor of Petroleum Engineering, Emeritus

CHARLES FREDERICK PARK, JR., Professor of Geology, and Dean of the School of Mineral Sciences
FRED LASALLE HUMPHREY, Associate Professor of Mining Engineering, and Associate Dean of the School of Mineral Sciences
ORSON CUTLER SHEPARD, Professor of Metallurgy and Director of the Division of Technology
ARTHUR DAVID HOWARD, KONRAD BATES KRAUSKOPF, SIEMON WILLIAM MULLER, BEN MARKHAM PAGE, HUBERT G. SCHENCK, Professors of Geology
COLIN OSBORNE HUTTON, Professor of Mineralogy
FRANK GEORGE MILLER, Professor of Petroleum Engineering
ADOLPH KNOPF, HANS ERNST THALMANN, Visiting Professors of Geology
JOSEPH J. GRAHAM, Associate Professor of Geology
JOSHUA LAWRENCE SOSKE, The Henry Salvatori Associate Professor of Geophysics
ROBERT ROSS COMPTON, JOHN C. MANNING, C. MELVIN SWINNEY, GEORGE A. THOMPSON, Assistant Professors of Geology
MICHAEL WYATT, Assistant Professor of Mineralogy
———, Assistant Professor of Metallurgy
FREDERIC R. KELLEY, Instructor in Geology
KENNETH L. KEATING, RALPH PARKMAN, Instructors in Metallurgy
MYRA KEEN, Curator and Assistant Professor of Paleontology
CURT DIETZ, GEORGE LEAVITT HARRINGTON, ELEANORA BLISS KNOPF, EARL LEROY PACKARD, HANS KARL STAUFFER, GERALD ASHLEY WARING, Research Associates (By Courtesy)

The aims of the School of Mineral Sciences are threefold: (*a*) to train men for responsible positions in industry, government, education, and research in the fields of geology, paleontology, geochemistry, geophysics, mining, metallurgy, and petroleum engineering; (*b*) to conduct original investigations including the development of new principles, techniques, and procedures for the discovery, technology of production, conservation, and utilization of the nation's mineral resources; (*c*) to give general instruction in the mineral sciences as part of a well-rounded education.

UNDERGRADUATE DIVISION

Faculty Adviser.—A student may enter the School of Mineral Sciences when he has completed his Lower Division requirements, or when he has completed all requirements except 10 units in social sciences. For regularly enrolled students this is at the beginning of the junior year. Upon entering the School, a student should report to the Dean, who will designate a member of the faculty to act as his adviser. The adviser will aid the student in the selection of courses and will serve as consultant during his scholastic career. The adviser's approval of the study plan must be obtained before registration is completed at the beginning of each quarter.

Requirements for Degree of Bachelor of Science.—The curricula which follow include the requirements for the degree of Bachelor of Science in geology, geochemistry, geophysics, and mineral sciences with options in metallurgy, mining, and petroleum, and, in addition, typical requirements of the Lower Division. Since the latter vary somewhat according to the student's previous work, each student is advised to consult his Lower Division adviser regarding his specific Lower Division requirements. In geology an option in paleontology may be taken.

The order of courses in these curricula may be changed somewhat to suit individual needs. The curricula are particularly flexible for students who enter with high-school credits sufficient to satisfy the Lower Division requirements in foreign language and biology. Students without high-school credits in either of these subjects, and students with inadequate training in English and mathematics, may find it necessary to take an additional quarter or more in order to complete the required courses for graduation.

Substitution of other courses for some of the requirements listed below is possible in exceptional cases. In particular, students specializing in paleontology may take advanced biology courses in place of calculus, and may substitute Physics 21, 22, 23, 24, 28, 29 for Physics 51, 53, 55. Such changes in requirements should be arranged in consultation with the faculty adviser and must be approved by the faculty of the School.

ROTC.—Reserve Officers' Training Corps are maintained at Stanford by the Army, the Navy, and the Air Force (see Air, Military, and Naval Science and Tactics in this *Bulletin*). Students enrolled in geology, geochemistry, geophysics, or mineral sciences with options in metallurgy, mining, or petroleum who are also enrolled in an ROTC program will usually require more than the usual four years (twelve quarters) in the University to obtain a baccalaureate degree.

These Air, Military, and Naval Science courses require 36 units of credit in addition to the mineral science course requirements, and the additional time required will vary from one to three quarters depending upon the circumstances in each case.

GEOLOGY CURRICULUM

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, and 3	4	4	5
Mathematics 10, 11	3	3	..
English 2*a*, 2*b*	3	3	..
Mineral Sciences G1 or G1*a*	..	..	5
Electives (Note 1 and Note 2)	5	5	5
Physical Education (L.D. requirement)	(1)	(1)	(1)
	15	15	15

SECOND YEAR

	Autumn	Winter	Spring
History 10, 11, 12	4	4	4
Chemistry 20	4	..	..
Mathematics 21, 22 (Note 3)	..	3	3
Mineral Sciences G25, G2, G51	5	5	5
Mechanical Engineering 10	..	4	..
Civil Engineering 20	..	..	3
Physical Education (L.D. requirement)	(1)	(1)	(1)
	13	16	15

NOTE 1: These electives may be used for elementary courses in foreign language, English, biology, or mathematics if high-school preparation was inadequate.

NOTE 2: Any modern foreign language is accepted for the B.S. degree, but German is strongly recommended. Foreign language 22 and 23 are required.

NOTE 3: Completion of Mathematics 23 in addition to the courses listed is strongly recommended.

THIRD YEAR

	Autumn	Winter	Spring
Mineral Sciences G114, G105, G133, G107	10	5	2
Physics 51, 53, 55	5	5	5
Social Sciences (Note 4)	..	5	5
Electives	..	..	3
	15	15	15

Summer quarter: Mineral Sciences G108, G109 required, 15 units

FOURTH YEAR

	Autumn	Winter	Spring
Mineral Sciences G123, G124	5	5	..
Any *one* of the following: Mineral Sciences G181, G182, G183, G184, G185	5 *or*	5 *or*	5
Electives (Note 5)	(Sufficient to make 15 units each quarter)		

Note 4: Economics 1 and 2 are recommended for fulfillment of the Social Sciences requirement.
Note 5: A student who has taken Mineral Sciences G108 and G109 the preceding summer will normally graduate at the end of the winter quarter.

PALEONTOLOGY OPTION

FIRST YEAR

	Autumn	Winter	Spring
English 2a, 2b	3	3	..
Chemistry 1, 2, 3	4	4	5
History 10, 11, 12	4	4	4
Mathematics 10	3	..	..
Mineral Sciences G1, G2	..	5	5
	14	16	14

SECOND YEAR

	Autumn	Winter	Spring
Foreign Language 22, 23	3	3	..
Biology 20, 21, 22	5	5	5
Mineral Sciences G25, G51	5	..	5
Physics 21, 22; 23, 24; 28, 29	4	4	5
Mechanical Engineering 10	..	4	..
	17	16	15

THIRD YEAR

	Autumn	Winter	Spring
Mineral Sciences G114; G115; G116, G117	5	4	6
Mineral Sciences G111	..	1	..
Mineral Sciences G105, G107	5	..	2
Biology 170	4	..	..
Civil Engineering 20	..	..	3
Economics 1, 2	..	5	5
Electives	..	5	..
	14	15	16

Summer quarter: Mineral Sciences G108 (8 units) and G103 (5 units) required, 13 units

FOURTH YEAR

	Autumn	Winter	Spring
Mineral Sciences G118, G218	5	5	..
Mineral Sciences G160, G161	..	3	3
Biology 25, 30, 174	..	..	8
Electives	(Sufficient to make 13 units each quarter)		

GEOCHEMISTRY CURRICULUM

FIRST YEAR

(Same as for Geology)

SECOND YEAR

	Autumn	Winter	Spring
History 10, 11, 12	4	4	4
Chemistry 20	4	..	..
Mathematics 21, 22, 23	3	3	3
Mineral Sciences G25, G2, G51	5	5	5
Social Sciences 1 (Note 4)	..	..	5
Mechanical Engineering 10	..	4	..
Physical Education (L.D. requirement)	(1)	(1)	(1)
	16	16	17

THIRD YEAR

Mineral Sciences G105, G133, G107	5	5	2
Mineral Sciences G123, G124	5	5	..
Social Sciences (Note 4)	..	..	5
Physics 51, 53, 55	5	5	5
Civil Engineering 20	3	..	..
Electives	..	..	3
	18	15	15

Summer quarter: Mineral Sciences G108, G109 required, 15 units

FOURTH YEAR

Mineral Sciences G183 or G181	5 *or*	5	..
Physics 57	3	..	..
Chemistry 110, 111, 171, 173	8	5	..
Mineral Sciences G170	..	4	..

Electives (Note 5)....................(Sufficient to make at least 15 units each quarter)

GEOPHYSICS CURRICULUM

FIRST YEAR

(Same as for Geology)

SECOND YEAR

(Same as for Geochemistry)

THIRD YEAR

	Autumn	Winter	Spring
Mineral Sciences G105, G133, G107	5	5	2
Mineral Sciences G123, G124	5	5	..
Social Sciences (Note 4)	..	..	5
Physics 51, 53, 55	5	5	5
Civil Engineering 20	3	..	..
Mathematics 24	..	..	3
	18	15	15

Summer quarter: Mineral Sciences G108, G109 required, 15 units

FOURTH YEAR

Mineral Sciences G181, G182, G183, or G185	5 *or*	5 *or*	5
Mineral Sciences G190, G191	3	3	..
Mathematics 130, 131	3	3	..
Civil Engineering 99, 100	4	3	..
Physics 57, 91, 93, 94	3	3	4

Electives (Note 5)....................(Sufficient to make at least 15 units each quarter)

MINERAL TECHNOLOGY CURRICULA

Four-year undergraduate Mineral Technology Curricula are planned to provide breadth of training with a maximum of fundamental science and engineering. These curricula lead to the Bachelor of Science degree in mineral sciences, with options in metallurgy, mining, and petroleum.

In order to include sufficient specialized courses to meet professional rating requirements, fifth-year curricula leading to the Master of Science degree in metallurgical engineering, mining engineering, or petroleum engineering are listed.

MINING OPTION

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, 3	4	4	5
Mathematics 10, 11, 21	3	3	3
Mechanical Engineering 8, 10	4	4	..
Mineral Sciences M1, G1	..	1	5
English *2a*, *2b*	3	..	3
Foreign Language 22, 23	3	3	..
	17	15	16

SECOND YEAR

	Autumn	Winter	Spring
Physics 51, 53, 55	5	5	5
Mathematics 22, 23	3	3	..
Social Sciences 1, 2	..	5	5
Mineral Sciences G25, G51	5	..	5
Civil Engineering 20	3	..	..
Elective	..	2	..
	16	15	15

THIRD YEAR

	Autumn	Winter	Spring
History 10, 11, 12	4	4	4
Civil Engineering 99, 100n, 110, 112	4	5	5
Industrial Engineering 130	..	3	..
Mineral Sciences G105, G107	5	..	2
Mineral Sciences M101, M114, M115	5	..	4
Elective	..	3	..
	18	15	15

FOURTH YEAR

	Autumn	Winter	Spring
Civil Engineering 106, 125	5	..	3
Electrical Engineering 100, 102	..	3	3
Mineral Sciences M100, M117	1	..	2
Mineral Sciences M102*a*, M102*b*, M109	3	3	2
Mineral Sciences G183	5	..	..
Elective	..	7	3
	14	13	13

FIFTH YEAR

During the fifth year the student may specialize in either mine exploration and development or mine management.

Mine Exploration and Development

*Required Courses**	Autumn	Winter	Spring
Mineral Sciences G123, G181, G190	5	5	5
Mineral Sciences M104, M201	3	..	3
Mineral Sciences M212, M214, M300	..	9	3
Elective	7	1	4
	15	15	15

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* Substitutions may be made, with the consent of the adviser, not to exceed 15 units. G107 and G108 (Summer Geology) may be substituted for G123, G181, and M300.

Recommended Electives

Mineral Sciences G107, G108 Summer Geology	15 units
Mineral Sciences G184 Engineering Geology	3 units
Mineral Sciences G124 Petrography	5 units
Mineral Sciences M208 Mining Law	2 units
Civil Engineering 127 Engineering Surveys	3 units
Civil Engineering 154 Construction Estimates and Costs	3 units
Civil Engineering 155 Construction Equipment and Methods	3 units
Industrial Engineering 100 Industrial Organization and Management	3 units

Mine Management

Required Courses†	Autumn	Winter	Spring
Mineral Sciences G181	..	..	5
Mineral Sciences M104, M201, M212, M214	3	9	3
Industrial Engineering 100, 133	3	3	..
Civil Engineering 154	..	3	..
Elective	9	..	7
	15	15	15

Recommended Electives

Business 260 Business Organization	6 units
Economics 100 Value and Price	5 units
Economics 145 Labor Problems	5 units
Mineral Sciences G107, G108 Summer Geology	15 units
Mineral Sciences G184 Engineering Geology	3 units
Mineral Sciences M208 Mining Law	2 units

Metallurgical Option

FIRST YEAR

	Autumn	Winter	Spring
Chemistry 1, 2, 3	4	4	5
Mathematics 10, 11, 21	3	3	3
English 2*a*, 2*b*	3	3	..
Foreign Language 22, 23	3	3	..
Mechanical Engineering 1, 8	2	..	4
Mineral Sciences G1 or G1*a*	..	..	5
Elective	..	2	..
	15	15	17

SECOND YEAR

	Autumn	Winter	Spring
Chemistry 20	4	..	..
Mathematics 22, 23, 24	3	3	3
Physics 51, 53, 55	5	5	5
History 10, 11, 12	4	4	4
Mechanical Engineering 2	..	..	2
Mineral Sciences M104	..	3	..
	16	15	14

THIRD YEAR

	Autumn	Winter	Spring
Chemistry 112, 113	..	5	..
Social Sciences 1, 2	..	5	5
Civil Engineering 99, 100*n*, 110, 112	5	5	5
Mechanical Engineering 10	..	..	4
Mineral Sciences G25, M102*a*, M102*b*, M109, M120	8	3	3
Elective	3	..	..
	16	18	17

FOURTH YEAR

	Autumn	Winter	Spring
Chemistry 171, 173, 175, 176	3	3	6
Physics 57	3	..	..
Civil Engineering 106	5	..	..
Industrial Engineering 100, 130	..	6	..
Mineral Sciences M111, M121, M124, M125	2	3	6
Elective	3	3	3
	15	15	15

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† Substitutions may be made, with the consent of the adviser, not to exceed 10 units.

FIFTH YEAR

	Autumn	Winter	Spring
Mineral Sciences M230, M236, M237, M240	4	4	4
Mineral Sciences M226, M228, M229	3	3	2
Electives	8	8	9
	15	15	15

METALLURGICAL SCIENCE*

(First and second years same as for Metallurgical Option.)

THIRD YEAR

	Autumn	Winter	Spring
Chemistry 112, 113	..	6	..
Mathematics 113, 130, 131, 132	3	6	3
Physics 89	3	..	..
Social Sciences 1	..	..	5
Civil Engineering 110, 112	..	..	5
Mineral Sciences G25, M102*a*, M102*b*, M109, M120	8	3	3
	14	15	16

FOURTH YEAR

	Autumn	Winter	Spring
Chemistry 171, 173, 175, 176	3	3	6
Mathematics 123	3	..	..
Physics 57, 91, 93, 94	3	3	4
Social Sciences 2	5	..	..
Civil Engineering 106, 114	..	5	3
Mineral Sciences M121, M124	..	3	3
	14	14	16

PETROLEUM OPTION

FIRST YEAR

	Autumn	Winter	Spring
Mathematics 10, 11, 21	3	3	3
Foreign Languages 22, 23 (Note 1)	3	3	..
English 2*a*, 2*b*	..	3	3
Chemistry 1, 2, 3	4	4	5
Mineral Sciences G1 or G1*a*, G2	5	..	5
Physical Education (L.D. requirement)	(1)	(1)	(1)
Elective	..	2	..
	15	15	16

SECOND YEAR

	Autumn	Winter	Spring
Mathematics 22, 23, 24	3	3	3
Physics 51, 55, 53	5	5	5
History 10, 11, 12	4	4	4
Mineral Sciences M103, M104	3	..	3
Mechanical Engineering 8	..	4	..
Physical Education (L.D. requirement)	(1)	(1)	(1)
	15	16	15

THIRD YEAR

	Autumn	Winter	Spring
Civil Engineering 99, 110, 112, 100*n*	5	5	5
Mineral Sciences G25, M108, G51	8	..	5
Social Sciences 1, 2 (Note 2)	..	5	5
Chemistry 121	3	..	..
Mechanical Engineering 10	..	4	..
Electives (Note 3)	..	..	1
	16	14	16

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* With the approval of the faculty, substitutions can be made to meet the needs of students with special interests.

FOURTH YEAR

	Autumn	Winter	Spring
Mineral Sciences G105, M141, M142, M144, M146, M148, M160	10	3	6
Civil Engineering 106, 20	..	5	3
Chemistry 171, 173	3	3	..
Electives (Note 3)	2	4	5
	15	15	14

FIFTH YEAR

	Autumn	Winter	Spring
Mineral Sciences M262*a*, M262*b*, M262*c*, M265, M266, M267	3	9	6
Electrical Engineering 100, 102	3	3	..
Mechanical Engineering 132, 133	3	3	..
Electives (Note 4)	5	2	8
	14	17	14

Note 1: Any modern foreign language is accepted for the B.S. degree, but German is strongly recommended.

Note 2: Economics 1 and 2 are recommended for fulfillment of the Social Sciences requirement.

Note 3: Ten hours of the following electives are required for the B.S. degree: English 129, Business Law I, II, Industrial Engineering 100, 130, Business Organization 260, Mineral Sciences G182, G190, M145, Mathematics 130, Chemistry 177, 179, Mechanical Engineering 1, 3, 118, 132, 133, Electrical Engineering 100, 102.

Note 4: Ten hours of electives listed under Note 3, exclusive of Electrical Engineering 100, 102, and Mechanical Engineering 132, 133, are required of all students for the M.S. degree.

GRADUATE DIVISION

The seven undergraduate curricula offered by the School of Mineral Sciences are designed to give broad training, with emphasis on fundamental science. These curricula do not include sufficient specialization to prepare directly for professional work. The School offers graduate programs planned to prepare the student for responsible positions in industry, research, governmental work, and education. These programs lead to the advanced degrees of Master of Science, Engineer, and Doctor of Philosophy.

Admission to the Graduate Division.—A student who wishes to enroll for graduate work in the School must be qualified for graduate standing in the University (see *Information Bulletin*), and in addition must be accepted by the School of Mineral Sciences. With the limited facilities available, it is not possible to accept all who apply for admission. Candidates for admission to the School must file the results of their Graduate Record Examination prior to admittance. This examination may be taken at most American colleges (see your Registrar for further information). Foreign students may be admitted without the Graduate Record Examination, but will be expected to take it soon after enrolling. Exceptions may be made for foreign students whose native tongue is not English. This examination is required of all candidates for the degree of Doctor of Philosophy.

Faculty Adviser.—Upon entering the Graduate Division the student should report to the Dean, who will arrange with a member of the faculty to act as the student's adviser. The student, in consultation with the adviser, then arranges a course of study for the first quarter, and ultimately a complete plan of study for the degree sought.

Opportunities for Original Investigation.—Stanford University is situated in a region that invites geologic field research at all seasons of the year. The California Coast Ranges, Sierra Nevada, Cascade Mountains, Columbia Plateau, and the Basin Ranges are all within easy reach, and their complex geology offers many unsolved problems in all branches of the science. Laboratories are available for research in the various branches of geology, including paleontology and micropaleontology, mineralogy, petrology, geomorphology, economic geology, ground water, geochemistry, and geophysics. Facilities are also available tor investigation and research in physical and process metallurgy and in mining and petroleum engineering, including laboratories for the following purposes: chemical analysis; physicochemical measurements; spectrography; x-ray diffraction; mineral dressing; metallurgical analysis; physical testing; metallography; pyrometry; electro-metallurgy; petroleum engineering studies.

The proximity of mines, oil fields, petroleum laboratories and refineries, and a variety of metallurgical industries facilitate field work and industrial co-operation on engineering research projects.

MASTER OF SCIENCE

Objectives.—To round out the student's training for professional work in one of the fields of Mineral Sciences through the completion of fundamental courses, both in the major field and in related sciences, and by obtaining a start on independent work and specialization.

Requirements for the Degree.—The candidate must be registered in the graduate school for at least three quarters. He must complete 45 units, not more than 10 of which may be applied to overcoming undergraduate deficiencies. He must pass the Graduate Record Examination and must remove all deficiencies indicated in this examination; and he must demonstrate by examination his ability to read a foreign language. The foreign language examination must be passed before the candidate files for the Master of Science degree. He must have a B average in courses offered by the School of Mineral Sciences.

Geological candidates for the Master of Science degree may take 15 units of elective courses outside of the School of Mineral Sciences. The 15 units shall include the allowed maximum of 10 units which may be applied to remove undergraduate deficiencies, as stated in the preceding paragraph. In addition at least 5 units of research in mineral sciences are required.

The recommended elective courses for which candidates will get credit toward the Master of Science degree in geology and geophysics are given below. Other courses may be approved by petition to the faculty.

Biology
25. Genetics
30. Evolution
132. Vertebrate Phylogeny
170. Paleobotany
174. Biogeography
184. Principles of Systematic Biology
189. Quantitative Methods in Biology
250. Philosophy of Biology

Chemistry
121. Organic Chemistry
171. Physical Chemistry
173. Physical Chemistry
175. Physical Chemistry

Engineering (Civil)
99. Statics
100*n*. Dynamics
106. Mechanics of Fluids
110. Mechanics of Materials
160. Hydraulic Engineering
162. Hydrology
195. Soil Mechanics

Engineering (Industrial)
130. Engineering Economy

Physics
89. Mechanics II
91. Electricity II
93. Electricity III
94. Electrical Measurements
141. Electron Tubes in Physical Research
142. Electron Tube Laboratory
151. Physical Optics I

Geography
1. Introduction to Geography
4. Economic Geography
Regional Geography: 111, 120, 121, 130, 133, 145
150. Intermediate Cartography

Law
101. Business Law I
102. Business Law II

Mathematics
100. Advanced Calculus
113. Vector Analysis
130. Ordinary Differential Equations
131. Partial Differential Equations I
132. Partial Differential Equations II

Fifth-year curricula leading to Master of Science degrees in mining engineering, metallurgical engineering, and petroleum engineering are shown with the undergraduate curricula in these fields.

ENGINEER

[Given only in mining, metallurgical, and petroleum engineering.]

Objectives.—To round out the student's training through additional work in engineering and related sciences and by additional specialization.

Requirements for the Degree.—A minimum of two years (six quarters) of graduate study is required. At least one of these years, ordinarily the last, must be spent as a registered student at Stanford. The candidate must complete 90 units of course work, no more than 10 of which may be applied to overcoming deficiencies in undergraduate training. At least 30 units must be taken in advanced work, that is, work beyond the undergraduate requirements, in engineering and closely allied fields. The student must pass the Graduate Record Examination and remove all deficiencies therein indicated, and demonstrate by examination his ability to read one foreign language. He must have a B average in courses given by the School of Mineral Sciences. He must prepare a thesis meeting the approval of the supervising instructor and the Graduate Study Committee.

DOCTOR OF PHILOSOPHY

Objectives.—The degree of Doctor of Philosophy is conferred upon evidence of substantial scholarship as well as high attainment in a particular field of Mineral Sciences, and ability to conduct an independent investigation and to present the results of such research.

Requirements for the Degree.—A minimum of three years (nine quarters) of graduate study must be satisfactorily completed. At least one of these years, ordinarily the last, must be spent as a registered student at Stanford. The candidate must pass the Graduate Record Examination and remove all deficiencies therein indicated. He must demonstrate by examination his ability to read German and one other foreign language. His record must indicate outstanding scholarship. He must pass the departmental oral examination. He must fulfill the requirements of the minor department, if a minor is elected. He must pass the University oral examination, which is essentially a defense of the dissertation problem. He must prepare under faculty supervision a dissertation which is a contribution to knowledge and the result of independent work expressed in satisfactory form.

The Ph.D. dissertation must be submitted in its final form within five calendar years from the date of the last quarter of graduate work in residence. Candidates for the degree who fail to meet this deadline will be required to retake the departmental and the University oral examinations and will be given an additional one year in which to submit their dissertations.

FINANCIAL ASSISTANCE

Scholarships and Fellowships.—The following scholarships and fellowships are available to students in the School of Mineral Sciences. Admission requirements to the school must be completed before applications will be considered. Applications should be filed with the Secretary, School of Mineral Sciences, by February 15, for awards which become effective in Autumn quarter for the following year. Application blanks may be obtained from the Registrar's Office or from the Secretary of the School of Mineral Sciences, Room 340, Geology Building: American Brake Shoe Scholarship Grant; American Society for Metals Scholarship; August Berner Honors Scholarship; W. F. Detert Honors Scholarship; Mr. and Mrs. Frank Hornkohl Honors Scholarship; International Nickel Company Fellowship in Metallurgy; Eric Knight Jordan Research Fellowship in Geology; Martin Memorial Honors Scholarship; Robert H. Palmer Scholarship; Pearson-Sibert Oil Company of Texas Honors Scholarship; Austin Flint Rogers Research Fellowship in Mineralogy; Shell Fellowship in Geology; Socony Vacuum–General Petroleum Scholarship; Standard Oil Company of California Fellowship; John van Steen Tolman Memorial Honors Scholarship in Economic Geology; University Honors Fellowship in Mineral Sciences; Donald K. Weaver Memorial Honors Scholarship in Petroleum Engineering; Western Die Casting Company Scholarship in Metallurgy.

[Note.—For details concerning these scholarships and fellowships as well as others available to all University students, consult the *Information Bulletin*.]

Research Grants.—The Fisher Research Laboratory of Palo Alto has established a fund to be awarded to students doing research in geophysics. The Shell Oil Company also sponsors a grant from which awards may be made to students doing fundamental research in geology. Other research funds are available from time to time.

Assistantships.—Normally, about ten teaching assistantships are awarded to qualified students to assist in laboratory instruction. Salary is $250 per quarter and the teaching assistant is expected to instruct two laboratory periods per week (6–10 hours). Admission requirements to the School of Mineral Sciences must be completed before applications will be considered. Application forms may be obtained from the Secretary, School of Mineral Sciences and must be on file by February 15 of the preceding academic year.

GENERAL GEOLOGY

[Courses in the 200 and 400 series are ordinarily not open to undergraduates.]
[Courses are offered for a ten-week period in the summer quarter, unless otherwise noted.]

G1. Physical Geology.—An elementary study of the earth, particularly of its materials, structure, and internal condition, and of the physical and chemical processes at work upon and within it. Lectures, laboratory, and field study. One three-hour laboratory period per week, and two field excursions per quarter are arranged to conform to the student's schedule. (Students who have taken Physical Sciences 3 will receive only 3 units credit for Mineral Sciences G1 or G1*a*.) Prerequisites: none.
5 units, autumn, *winter, and *summer (8 weeks) quarters (Swinney, Page, ———) Lec. MTWTh 8; Lab. and field trips by arrangement

G1a. Geology for Engineers.—This is Physical Geology modified with special reference to the needs of engineers, but open to others. Lectures, discussions, laboratory, and field work. One three-hour laboratory period per week and two field trips per quarter are arranged to conform to the student's schedule. Prerequisite: elementary chemistry.
5 units, spring quarter (Manning) Lec. MWF 8; Lab. and field trips by arrangement

G2. Historical Geology.—The evolution of the continents, oceans, mountain systems, and other features of the earth, and the development of its animal and plant inhabitants. Prerequisite: Mineral Sciences G1 or G1*a*.
5 units, winter and *spring quarters (Kelley, Graham)
Lec. MWF 10; one 3-hour lab. and two field trips by arrangement

G103. Geologic Problems. — Supervised reading and written reports thereon.
3 to 10 units, each quarter (Staff) By arrangement

G105. Structural Geology.—A study of folds, faults, and other structural features in the outer part of the earth. Prerequisites: Mineral Sciences G1 or G1*a*, G51. Recommended: Mineral Sciences G2, Mechanical Engineering 10.
5 units, autumn quarter (PAGE) Lec. MTWTh 9
One lab. period and field trips by arrangement

G107. Geologic Field Techniques.—An introduction to geologic field methods and instruments.
2 units, spring quarter (STAFF) By arrangement

G108. Field Geology I.—First half of summer field work with the Stanford Geological Survey. Camp will probably be established in one of the California Coast Ranges. Geology of the district, involving several sedimentary formations and various structural features, will be studied and plotted upon available topographic maps and aerial photographs. The resulting small maps will be combined into a single finished geologic map of the district. A carefully written report and cross sections will be prepared by each student. (For second half of summer field work, see Mineral Sciences G109.) Prerequisites: Mineral Sciences G1 or G1*a*, G2, G25, G51, G105, G107, Civil Engineering 20. (Not open to women students.)
8 units, summer quarter (first half) (COMPTON)

G109. Field Geology II.—Second half of summer field work with the Stanford Geological Survey. Camp will probably be established in a mining district in Nevada or eastern California. Topography of the district and geology, including ore deposits and igneous and metamorphic rocks, will be accurately plotted in detail by plane table methods, and the maps of individual student parties will be assembled into a single map. Prerequisite: Mineral Sciences G108. (Not open to women students.)
7 units, summer quarter (second half) (COMPTON)

G133. Principles of Geomorphology.—A study of land forms and the processes which create and modify them. Several field trips are arranged. Prerequisites: Mineral Sciences G1, G2, G51, G105.
5 units, winter quarter (HOWARD) Lec. MWF 10; Lab. W 2–5
(Field trips by arrangement)

G134. Map Interpretation.—The use of topographic maps in the interpretation of geologic structures and in the analysis of local and regional geomorphic development. Prerequisite: Mineral Sciences G133.
5 units, spring quarter (HOWARD) Lec. MWF 10; Lab. W 2–5
(Field trips by arrangement)
[Not given in 1954–55]

G135. Photogrammetry and Photogeology.—A discussion of photogrammetric principles and practices applicable to geology, and geologic interpretations from air photos.
5 units, spring quarter (HOWARD) Lec. MWF 10; Lab. W 2–5 and
one lab. by arrangement

G233. Advanced Geomorphology.—A consideration of the various types of geomorphic problems and the methods and techniques used in their investigation.
3 units, spring quarter (HOWARD) By arrangement

G301. Problems in Various Fields of Geology, Geochemistry, and Geophysics.
Each quarter (STAFF) By arrangement

G326. Fundamental Problems of Geology.—Prerequisite: one year of graduate work.
3 units, autumn quarter (KNOPF) Lec. MWF 9

G337. Seminar in Geomorphology.
(HOWARD) By arrangement

G361. Permafrost.—Engineering problems in permanently frozen ground. Open to graduate students, others by permission of instructor.
2 units, winter quarter (MULLER) T 2–4
[In alternate years; not given in 1954–55]

G377. Seminar in Structural Geology.
3 units, spring quarter (PAGE) By arrangement

G400. Research in Various Fields of Geology, Geochemistry, and Geophysics.
Each quarter (STAFF) By arrangement

G417. Seminar in Geology of Eastern Asia.
2 units, autumn quarter (KRAUSKOPF) By arrangement
[In alternate years; not given in 1954–55]

G427. Seminar in Military Geology.
2 units, autumn quarter (KRAUSKOPF) By arrangement
[In alternate years; given in 1954–55]

G437. Seminar in Geology of Britain.
2 units, autumn quarter (WYATT) By arrangement

MINERALOGY AND PETROLOGY

G25. Elementary Mineralogy and Crystallography.—A study of symmetry, face indices, zones and stereographic projections, and of approximately seventy of the common minerals. Prerequisites: Mineral Sciences G1 or G1*a*, Chemistry 3, or equivalents.
5 units, autumn quarter (WYATT) Lec. TTh 10; Lab. TTh 1–4
(and one lab. period by arrangement)

G51. Elementary Petrology.—A study of the origin, occurrence, and classification of the more common rocks with emphasis on hand lens identification. Prerequisites: Mineral Sciences G1 or G1*a*, G25.
5 units, spring quarter (SWINNEY) MWF 9
Lab. MW or TTh and field trips by arrangement

G121. Mineral Identification.—The identification of rock-forming and ore minerals by simple chemical and physical tests. Prerequisite: Mineral Sciences G25.
3 units, winter quarter (WYATT) Lab. MWF 1–4

G123. Optical Mineralogy.—(*a*) An elementary study of the optical properties of crystals, with emphasis upon the polarizing microscope as an instrument of research. (*b*) Systematic study of the important silicate minerals and their determination by optical methods. Prerequisites: Mineral Sciences G25, and Physics 55, or equivalents.
5 units, autumn quarter (HUTTON) Lec. TTh 11; Lab. (I) MW 1–4;
(II) TTh 1–4 (and one lab. period by arrangement)

G124. Petrography.—The use of the petrographic microscope in identifying and classifying rocks, and in determining the origin and geologic history of rocks and rock masses. Prerequisites: Mineral Sciences G51, G123.
5 units, winter quarter (COMPTON) Lec. TTh 11; Lab. TTh 1–4
(and one lab. period by arrangement)

G126. Crystallography.—A systematic study of the thirty-two classes, including work with the reflecting goniometer, and an introduction to crystal structure and its effect on the external form of crystals. Prerequisites: Mineral Sciences G25 and permission of instructor to enroll.
4 units, winter quarter (WYATT) Lec. WF 9
(and two lab. periods by arrangement)

G170. Elementary Geochemistry.—The application of chemical principles to geologic processes. Prerequisites: Mineral Sciences G51 and Chemistry 20. Recommended: Concurrent or previous registration in Chemistry 171.
3 units, autumn quarter (KRAUSKOPF) Lec. TTh 8; Lab. W 1–4

G171. Advanced Geochemistry.—The distribution of the chemical elements in geologic materials and environments. Prerequisite: Mineral Sciences G170 or Chemistry 173.

3 units, winter quarter (Krauskopf) Lec. T 8–10, Th 8–9

G207. Sedimentation.—The characteristics and origin of sedimentary deposits. Prerequisites: Mineral Sciences G1 or G1*a*, G2, G25, G51, G124.

5 units, spring quarter (Thompson) MWF 9
Lab. and field work by arrangement

G223. Mineralogy of Sediments.—(*a*) A study of the laboratory methods for fractionating sediments. (*b*) A systematic study of mineral particles. Prerequisites: Mineral Sciences G124, and permission of instructor to enroll.

5 units, spring quarter (Hutton) Lec. F 11; Lab. TTh 1–4 (and two lab. periods by arrangement)

G224. Advanced Petrology.—A graduate course covering advanced topics of igneous and metamorphic petrology. Prerequisites: Mineral Sciences G105, G124.

5 units, spring quarter (Compton) Lec., lab., and field work by arrangement

G225. Advanced Mineralogy.—(*a*) A survey of the methods for mineral diagnosis. (*b*) A systematic study of the more important rock-forming and ore minerals. Prerequisites: Mineral Sciences G124, Chemistry 110, 111, and permission of instructor to enroll.

5 units, winter quarter (Hutton) Lec. MW 10; Lab. MW 1–4
(and one lab. period by arrangement)

G227. Mineral Paragenesis.—A theoretical discussion of the origin and association of the rock-forming minerals, with emphasis on the application of the phase rule. Prerequisite: Mineral Sciences G124.

4 units, spring quarter (Wyatt) Lec. MWF 11
(and one lab. period by arrangement)

G270. Geochemistry of Ore Solutions.—Prerequisites: Mineral Sciences G170 and G183.

2 units, spring quarter (Krauskopf) By arrangement

G327. Seminar in Petrology.—Discussion of current literature and problems relating to petrology.

2 units, winter quarter (Knopf) By arrangement

G347. Seminar in Mineralogy.

(Hutton, Wyatt) By arrangement

G407. Seminar in Geochemistry.

2 units, autumn and *spring quarters (Krauskopf) By arrangement

PALEONTOLOGY AND STRATIGRAPHY

G111. Curatorial Methods in Paleontology.

1 unit, winter quarter (Keen) By arrangement

G114. Elementary Paleontology.—Prerequisite: Mineral Sciences G2.

5 units, autumn quarter (Muller) MWF 11; Lab. W 2–5
(and one lab. period by arrangement)

G115. Systematic Invertebrate Paleontology (Part I).—Selected phyla. Prerequisite: Mineral Sciences G114.

4 units, winter quarter (Graham) TTh 9; Lab. W 2–5
(Other lab. by arrangement)
[In alternate years; not given in 1954–55]

G116. Systematic Invertebrate Paleontology (Part II).—Continuation of Part I. Prerequisite: Mineral Sciences G115, or equivalent.

4 units, spring quarter (Muller) TTh 9; Lab. W 2–5
(Other lab. by arrangement)
[In alternate years; not given in 1954–55]

G117. Systematic Invertebrate Paleontology (Part III).—Mollusca, except Cephalopoda. Prerequisite: Mineral Sciences G115, or equivalent. G117 can be and generally is taken concurrently with G116.
2 units, spring quarter (KEEN) By arrangement
[In alternate years; not given in 1954–55]

G118. Micropaleontology.—Principles and fundamentals of the subject in which techniques of preparation and classification of many kinds of fossil plants and animals are discussed. Prerequisites: Mineral Sciences G2, G116, G117, or equivalents.
5 units, autumn quarter (GRAHAM) By arrangement
[Not given in 1954–55]

G160. Elementary Stratigraphy. — Classification of stratigraphic units, facies, unconformities, principles of correlation. Prerequisite: Mineral Sciences G2. Recommended: Mineral Sciences G114.
3 units, winter quarter (MULLER) Lec. TTh 10; Lab. F 1–4

G161. Procedure in Stratigraphy.—Continuation of Course G160. Analysis of stratigraphic problems: co-ordination of field procedure with the preparation of geological reports; graphic presentation of stratigraphic results. Prerequisites: Mineral Sciences G107 or equivalent, and G160.
3 units, spring quarter (MULLER) Lec. MW 11; Lab. F 1–4

G162. Biostratigraphy.—Chronologic-biostratigraphic classification of sediments based on sequence of faunal assemblages. Prerequisites: Mineral Sciences G107 or equivalent, and G160.
5 units, autumn quarter (THALMANN) MW 8
Field problem by arrangement

G218. Micropaleontology (Foraminifera).—Introduction to the study of the smaller and larger Foraminifera and their practical application in petroleum geology. Prerequisite: Mineral Sciences G118.
5 units, winter quarter (THALMANN) By arrangement

G263a. Foreign Oilfields (Part I).—Central and South America. Age of oil-bearing horizons, stratigraphic sequences; structures; extent and productivity of oil fields outside United States and Canada.
2 units, autumn quarter (THALMANN) TTh 4

G263b. Foreign Oilfields (Part II).—Africa, Europe, Soviet Russia. Continuation of Part I.
2 units, winter quarter (THALMANN) TTh 4

G263c. Foreign Oilfields (Part III).—Asia, Indonesia, Australia. Continuation of Part II.
2 units, spring quarter (THALMANN) TTh 4

G314. Seminar in Micropaleontology.—History of the subject, problems in applied micropaleontology, and discussion of current literature.
2 units, each quarter (GRAHAM, THALMANN) By arrangement

G316. Palynology.—Introduction to the study of fossil spores and pollen and their stratigraphic application.
3 units, spring quarter (THALMANN) By arrangement

G364. Morphology and Stratigraphic Distribution of Cephalopods.—Prerequisites: Mineral Sciences G114, G115, G116, G117, G160.
3 units, autumn quarter (MULLER) Lec. TTh 10; Lab. by arrangement
[In alternate years; given in 1954–55]

G367. Seminar in Paleontology and Stratigraphy.—Limited enrollment by approval of instructors. Normally for second and third year graduates.
2 units, each quarter (GRAHAM, KEEN, MULLER, THALMANN) By arrangement

[**Paleobotany.**—See Biology 170.]

[**Biogeography.**—See Biology 174.]

[**Quantitative Methods in Biology.**—See Biology 189.]

ECONOMIC GEOLOGY

G181. Nonmetallic Deposits.—Principles of the geologic occurrence of economic mineral resources, excluding metallic ores, petroleum, and ground water. Prerequisites: Mineral Sciences G1 or G1*a*, G2, G25, G51 (the latter may be taken concurrently). Recommended: Mineral Sciences G105.
5 units, spring quarter (PAGE) Lec. MTWTh 8; Lab. and field trips by arrangement

G182. Geology of Petroleum.—Principles of the occurrence and accumulation of petroleum. Laboratory consists of practice in modern techniques. Prerequisites: Mineral Sciences G1 or G1*a*, G2, G25, G51, G105.
5 units, spring quarter (KELLEY) Lec. MWF 11
Lab. and field work by arrangement

G183. Ore Deposits.—The principles of the occurrence, processes of deposition, and structure of ores. Prerequisites: Mineral Sciences G1 or G1*a*, G2, G25, G51, G105.
5 units, autumn quarter (PARK) Lec. MTWTh 10
Lab. and field trips by arrangement

G184. Engineering Geology.—Application of geology to engineering practice in the construction of dams, highways, foundations, etc. Prerequisite: Mineral Sciences G1 or G1*a*. Recommended: Mineral Sciences G25, G51, G105.
3 units, autumn quarter (MANNING) Lec. TTh 8; Lab. by arrangement

G185. Geology of Ground Water.—Principles of the occurrence of underground water and the study of water resources. Prerequisites: Mineral Sciences G1 or G1*a*; Physics 21 or 51; Mathematics 22. Recommended: Mineral Sciences G2, G25, G51, G105.
5 units, winter quarter (MANNING) Lec. MWF 11; Sem. M 1–4; Lab. W or Th 1–4

G187. Minerals in World Affairs.—A study of mineral resources of the world, and their political and economic effects. Prerequisite: Upper Division or graduate standing.
3 units, winter quarter (PARK) MWF 9

G206. Paleogeology.—Regional studies of geologic history by use of isopach, paleogeologic, and facies maps.
5 units, autumn quarter (KELLEY) By arrangement

G283. Economic Minerals and Studies of Opaque Ores.—A study of economic minerals, principally metallic ore minerals. Techniques and methods of study of polished ore surfaces. Emphasis on microchemical and optical methods. Prerequisites: Mineral Sciences G124, G183.
3 units, winter quarter (SWINNEY) Lec. T 11; Lab. TTh 1–4

G307. Seminar in Petroleum Geology.
2 units (KELLEY) By arrangement

G317. Seminar in Study of Gems and Gem Materials.
2 units, spring quarter (SWINNEY) By arrangement

G383. Genesis of the Metallic Ores.—Advanced study of mineral and district collections with emphasis on genesis and localization control. Prerequisites: Mineral Sciences G124, G183, G283.
5 units, spring quarter (PARK) Lec. MW 10; Lab. MWF 1–4

G387. Seminar in Ore Deposits.—Conference discussion of current problems and ideas in economic geology.
2 units, autumn quarter (PARK) Th 4

G389. Seminar in Nonmetallic Deposits.
2 units, spring quarter (PAGE) By arrangement
[In alternate years; given in 1954–55]

G487. Seminar in Ground Water or Engineering Geology.
2 units (MANNING) By arrangement

GEOPHYSICS

G190. General Geophysics.—Introduction to the elements and principles of earth physics. Prerequisites: G25, G51, G105, Mathematics 22, Physics 53.
3 units, autumn quarter (THOMPSON) Lec. MW 11; Lab. by arrangement

G191. Procedures of Geophysical Exploration.—Geological applications, possibilities, and limitations of the several methods. Prerequisites: G25, G51, G105, Mathematics 22, Physics 53.
3 units, winter quarter (SOSKE) Lec. TTh 10; Lab. by arrangement

G291. Magnetic Measurements.—Theory and use of the field magnetic balance as an aid to geological investigations. Prerequisites: G107, G182, Mathematics 23, Physics 55.
3 units, autumn quarter (SOSKE) Two lec.; 3-hour lab. by arrangement

G292. Gravity Measurements.—Origin of gravity anomalies and the indirect method of analysis applicable to gravity measurements. Prerequisites: G107, G182, Mathematics 23, Physics 55.
3 units, winter quarter (SOSKE) Two lec.; 3-hour lab. by arrangement
[In alternate years; given in 1954–55]

G293. Electrical Measurements in Exploration.—Electrical methods of exploration. Prerequisites: G107, G182, Mathematics 23, Physics 55.
3 units, winter quarter (SOSKE) Two lec.; 3-hour lab. by arrangement
[In alternate years; not given in 1954–55]

G294. Seismic Exploration.—The principles and uses of the reflection and refraction seismographs as an aid to geological studies. Prerequisites: G107, G182, Mathematics 23, Physics 55.
4 units, spring quarter (SOSKE) Two lec.; two 3-hour labs. by arrangement

G328. Theoretical Structural Geology.—Interrelations in space and time of major earth structures, and the geophysical and geological evidence bearing on their origin; isostasy; seismic, gravimetric, and thermal data; mechanical considerations; sources of energy. Prerequisites: Mineral Sciences G105, G190 or equivalent.
5 units, winter quarter (THOMPSON) Lec. MWF 8; Lab. and seminar by arrangement

G397. Seminar in Geophysics.
(SOSKE, THOMPSON) By arrangement

MINING

M1. Introduction to Mining.—An orientation course to acquaint the student with the duties of a mining engineer and the type of environment in which he might live.
1 unit, winter quarter (HUMPHREY) T 10

M100. Industrial Report.—The student is required to submit a report covering a period of at least two consecutive months of industrial experience in underground or open-cut mining. Required for graduation in mining engineering.
1 unit, each quarter (HUMPHREY) By arrangement

M101. Principles of Mining.—Lectures. An introduction to the subject of metal mining. Covers prospecting and development, mine plant and equipment, mining methods, and mine-engineering problems in a condensed course to serve as a basis for advanced courses that follow. Serves the needs of the engineering student who seeks a general knowledge of mining.
3 units, autumn quarter (HUMPHREY) MWF 8

M114. Elementary Problems in Mining Engineering.—Problems involving the principles of mining, designed to supplement Course M101 as added work for those whose major interest is mining. Open to those who are concurrently registered in Course M101.
2 units, autumn quarter (HUMPHREY) TTh 8

M115. Prospecting and Development.—Lecture, seminar, and problems. Geological aspects; placer prospecting; prospecting for deposits in place; methods and costs; engineering features; boring methods; development plans; methods and costs of shaft sinking, drifting, and raising; engineering records. Prerequisites: Mineral Sciences M101 and G51.
4 units, spring quarter (HUMPHREY) Lec. TTh 8; Seminar by arrangement

M117. Mine Mapping.—Lecture, laboratory, and problems. Methods of mapping as used by mining companies; plan maps; geologic maps; stope maps; surface maps; sections and models. Prerequisites: Civil Engineering 20, Mineral Sciences G105.
2 units, spring quarter (HUMPHREY) TTh 1–4

M180. Field or Industrial Study and Report in Mining Engineering.
1 or 2 units, each quarter (HUMPHREY) By previous arrangement with instructor

M201. Mine Examination and Valuation.—Lectures and seminar on mining economy, sampling, ore estimation, extension of ore deposits, valuation, metal prices, and valuation reports.
3 units, spring quarter (———) MWF 9
[In alternate years; not given in 1954–55]

M204. Problems in Mine Economics.—Application of the principles given in Course M201, and open to those who have completed this course.
1 or 2 units, autumn quarter (HUMPHREY) By arrangement

M205. Practical Research in Spectrographic Analysis.—Fundamentals of spectroscopy and its application to the study of rocks, minerals, and alloys.
4 units, autumn quarter (HUMPHREY) Lec. TTh 10; Lab. TTh 1–4

M208. Mining Law.—Fundamentals of mining law in the United States and several foreign countries.
2 units, spring quarter (HUMPHREY) TTh 11

M212. Mine Plant and Equipment.—Seminar and problems in the selection and operation of mine equipment. A study of mine plant economics. Prerequisite: Mineral Sciences M101.
4 units, winter quarter (HUMPHREY) TTh 8; W 1

M214. Mining Methods.—Seminars and problems. The methods and costs of mine operation. Prerequisite: Mineral Sciences M101.
5 units, winter quarter (HUMPHREY) MW 10; Seminar by arrangement

M300. Advanced Work in Mining Engineering.
Each quarter (HUMPHREY) By arrangement

METALLURGY

M102a. Elements of Mineral Processing.—Lectures and demonstrations. An introductory course for the purpose of acquainting the metallurgical, mining, and chemical engineering student with the operations and processes currently used to separate and reduce useful minerals and metals from ores found in the earth's crust. Crushing and grinding, gravity separations, flotation process, magnetic separation, sampling and marketing of ores and minerals. Prerequisite: Chemistry 3 or 4, Physics 53, 55, or equivalents.
3 units, autumn quarter (KEATING) MWF 9

M102b. Elements of Mineral Processing.—Lectures. An introduction to the various processes for the production of metals from ores and concentrates. Covers roasting, smelting, and distillation methods as well as leaching and electrolytic processes. Prerequisite: Chemistry 173.
3 units, winter quarter (KEATING) MWF 8

M104. Principles of Physical Metallurgy.—Lectures. A course designed to acquaint the prospective engineer or chemist with the principles and criteria upon which are based the selection and treatment of metals; the nature and properties of metals; phases in alloy systems; the effect of composition, heat, and mechanical treatment upon the structure and physical properties of metals and alloys. Prerequisite: Chemistry 2.

3 units, autumn and *spring quarters (Shepard) MWF 10
3 units, *winter quarter (Shepard) MWF 9

M106. Mineral Processing Laboratory I.—Basic unit experiments in mineral liberation and concentration. Sampling, grinding, gravity, and flotation concentration of minerals and ores. Prerequisite: M102*a*.

2 units, autumn quarter (Keating) By arrangement

M107. Mineral Processing Laboratory II.—Unit processes and igneous chemistry in process metallurgy. Solid-gas reactions, high-temperature reduction, molten silicate reactions, and differential oxidaton of alloys. Prerequisites: M102*b*, M106.

2 units, winter quarter [Not given in 1954–55]

M109. Ore Testing Laboratory.—The design of ore treatment processes based on conventional laboratory tests of various ores. Tests are made to determine the liberation of minerals by grinding and the results which can be obtained by concentration and leaching processes. Prerequisites: Mineral Sciences M102*a*, M102*b*.

2 units, spring quarter (Keating) By arrangement

M111. Inspection and Testing of Metals.—An introduction to methods of determining the quality of metals and alloys; mechanical property measurements, macroscopic and microscopic examinations, the detection of defects by radiography, magnetic, fluorescent, and ultrasonic methods. Prerequisite: Mineral Sciences M104.

2 units, autumn quarter (Parkman) Th 9; Lab. Th. 1–4

M120. Industrial Report.—The student is required to submit a report covering a period of at least two consecutive months of industrial experience related to metallurgy.

1 unit, each quarter (Keating, Parkman, Shepard) By arrangement

M121. Metallurgical Calculations.—Solution of plant problems in metallurgical reduction processes. Furnace charge calculations, combustion calculations, process efficiencies, and high temperature stoichiometry. Prerequisites: Mineral Sciences M102, and Chemistry 3 or 4.

3 units, spring quarter (Keating) T 9 (and by arrangement)

M124. Elementary Metallography. — Fundamental theories of alloying. Construction and metallographic interpretation of phase diagrams. Thermal analysis. Characteristics of typical alloy systems. Correlated microscopic studies and physical property measurements. Prerequisite: Mineral Sciences M104.

3 units, winter quarter (Parkman) T 11; TTh 1–4

M125. Metallography and Heat Treatment.—The heat treatment, microstructure, selection, and properties of alloys with particular attention to iron-carbon alloys. Prerequisite: Mineral Sciences M124.

3 units, spring quarter (Parkman) T 11; TTh 1–4

M226. Electrometallurgy and Corrosion.—Lectures. Electrochemistry applied to metallurgy. Electrolysis as used for refining, and metal recovery. Electrochemistry in corrosion problems. Prerequisites: Mineral Sciences M102, Chemistry 175.

3 units, autumn quarter [Not given in 1954–55]

M228. Metallurgical Thermodynamics.—Lectures and problems. The theory and application of chemical thermodynamics in metallurgy and mineral processing. Prerequisites: Mineral Sciences M102, Chemistry 175.

3 units, winter quarter (Keating) TThS 11

M229. Physical Chemistry of Steelmaking.—Topics covering the theory and practice of steelmaking are reviewed in assigned reading and class discussions. Prerequisite: Mineral Sciences M228.
2 units, spring quarter (SHEPARD) By arrangement

M230. Metallurgy Seminar.—Weekly meeting for the review of current metallurgical literature.
1 unit, autumn, winter, and spring quarters (———, KEATING, PARKMAN, SHEPARD) By arrangement

M233. Metallography and Heat Treatment.—Advanced work in the heat treatment of steel. Hardenability, subcritical transformation studies, and special surface treatments. Prerequisite: Mineral Sciences M125.
3 units, autumn quarter (PARKMAN) M 10; Lab. MW 1–4

M234. Physical Metallurgy of Alloy Steels.—Effects of alloying elements on heat treatment, structure, and properties of steels. Detailed study of stainless, high-speed, and special alloy steels. Prerequisite: Mineral Sciences M125.
3 units, winter quarter (———) M 10; Lab. MW 1–4

M235. Physical Metallurgy of Light Metal Alloys.—Heat treatment, structure, and properties of the commercial alloys of aluminum, magnesium, and titanium. Prerequisite: Mineral Sciences M124.
3 units, spring quarter (———) M 10; Lab. MW 1–4

M236. X-ray Diffraction in Metallurgy.—Fundamentals of x-radiation. Diffraction of x-rays by crystals. Application of the important x-ray techniques to the study of metallurgical problems such as solid solubility, grain orientation and preferred orientation from cold work.
3 units, autumn quarter (SHEPARD) TTh 11; Lab. Th 1

M237. Physics of Metals.—Selected topics in the theory of the metallic state. Electronic theory of metals, electrical conductivity, thermal expansion, heat capacity, superlattice formation and related subjects. Prerequisite: Mineral Sciences M236.
3 units, winter quarter (———) MWF 10

M238. Physics of Metals Laboratory.—The investigation of metallic systems by studies of the elastic constants and internal friction, thermal and electrical conductivity, compressibility and thermal expansion. Prerequisite: Mineral Sciences M237.
1 unit, spring quarter (———) By arrangement

M240. Reaction Kinetics in Solids.—Diffusion in solids, nucleation, phase transformations, and precipitation phenomena. Prerequisites: Mineral Sciences M104, M237, or equivalents.
3 units, spring quarter (———) MWF 9

M320. Advanced Work in Process Metallurgy.
Each quarter (KEATING) By arrangement

M330. Advanced Work in Metallurgy.
Each quarter (SHEPARD) By arrangement

M340. Advanced Work in Metallurgy.
Each quarter (———) By arrangement

PETROLEUM ENGINEERING

M103. Principles of Petroleum Technology.—Lectures. Covers the whole subject of the development and exploitation of the oil field, arranged to give the student a comprehensive view of the industry; serves as an outline for the orderly development of professional studies, and also meets the needs of the general student. Properties, origin, accumulation, and occurrence of petroleum; valuation, development, and production of oil properties; storage and transportation of petroleum and its products. Prerequisite: Mineral Sciences G1 or G1*a*.
3 units, autumn quarter (———) MWF 8

M108. Physical Testing of Petroleum.—Laboratory, lectures, and demonstrations. Tests commonly made on crude petroleum and products, including determination of water content, density, viscosity, surface tension, volatility, refringence, and emulsibility; also the proximate analysis of crude petroleum and natural gas. Prerequisite: Mineral Sciences M103.
3 units, autumn quarter (———) Lec. MW 10; Lab. W 1–4

M141. Subsurface Technology.—Lectures, seminar, and problems covering the needs for subsurface information, description and use of subsurface instruments, and the application of subsurface data in the development and exploitation of the oil field. Prerequisite: Mineral Sciences M103.
3 units, autumn quarter (———) MWF 10

M142. The Flow of Homogeneous Fluids Through Porous Media.—An elementary treatment of fluid mechanics applied to the steady flow of gases and liquids in porous materials. Problems relating to the flow of hydrocarbon fluids in oil-reservoir rocks are emphasized. Prerequisites: Mineral Sciences M103, M108.
2 units, autumn quarter (MILLER) TTh 9

M144. Development Technology.—Lectures and problems. Selection and use of equipment and materials for drilling, cementing, testing, and completing or abandoning exploratory and producing oil and gas wells. Includes fundamental properties, testing, and treatment of drilling fluids. Prerequisites: Mineral Sciences M103, M141.
3 units, winter quarter (———) MWF 9

M146. Production Technology.—Lectures and problems. Selection and use of equipment and materials in the flowing, pumping, and gas-lifting of oil; production of natural gas, acidizing, cleaning-out, supplementing reservoir energy. Also includes practices of well spacing, proration, unitization, and conservation. Prerequisite: Mineral Sciences M144.
2 units, spring quarter (MILLER) TTh 9

M148. Laboratory Techniques.—Core analysis, methods and applications; testing of cements, analysis of oil-field waters, testing and treatment of drilling fluids. Prerequisite: Mineral Sciences M144.
3 units, spring quarter (———) MWF 1–4

M160. Industrial Report.—The student is required to submit a report covering a period of at least two consecutive months of industrial experience related to petroleum engineering.
1 unit, each quarter (MILLER) By arrangement

M262a. Reservoir Engineering.—Lectures, problems, and seminar. Geological and physical properties of reservoirs. Properties of reservoir fluids. Principles of fluid mechanics applied to single phase and multiphase flow of oil, gas, and water through porous media and reservoir rocks. Class limited to graduate students in mineral sciences.
3 units, autumn quarter (MILLER) By arrangement

M262b. Reservoir Engineering.—Continuation of Course M262*a*.
3 units, winter quarter (MILLER) By arrangement

M262c. Reservoir Engineering.—Continuation of Course M262*b*.
3 units, spring quarter (MILLER) By arrangement

M265. Advanced Laboratory Techniques.—Laboratory methods and techniques used in special problems of core analysis, movement of fluids through porous media, and petroleum production research. Prerequisites: Mineral Sciences M148, M262*a*.
3 units, winter quarter (———) One hour lec.; 6 hours lab. by arrangement

M266. Secondary Recovery of Petroleum.—Lectures, seminar, and problems. Selection of properties, design, development, operation, and economics of secondary recovery of petroleum. Prerequisites: Mineral Sciences M146, M262*a*, M262*b*.

3 units, spring quarter (Miller) MWF 9

M267. Oil Land Valuation.—Seminar and problems. The methods used in appraising oil lands; estimation of productive capacity and reserves; operating costs, depreciation of materials, salvage, value of future profits, tax returns. Prerequisite: Mineral Sciences M146.

3 units, winter quarter (———) Lec. MW 10

M360. Advanced Work in Petroleum Engineering.—Directed reading or laboratory.

Each quarter (Miller) By arrangement

NAVAL SCIENCE

———, Commanding Officer and Professor of Naval Science

JOSEPH N. BEHAN, JR., Lieutenant Commander, U.S. Navy, Executive Officer and Associate Professor of Naval Science

EDWARD E. KERR, Lieutenant Commander, U.S. Navy, Associate Professor of Naval Science

LOUIS R. DAZE, Major, U.S. Marine Corps, Assistant Professor of Naval Science

WOLF HEINBERG, Lieutenant, U.S. Navy, Assistant Professor of Naval Science

ROBERT C. PARSONS, Lieutenant, U.S. Navy, Assistant Professor of Naval Science

RICHARD A. DERUS, Lieutenant, U.S. Navy, Assistant Professor of Naval Science

HERBERT G. ANGLE, Lieutenant (j.g.), U.S. Navy, Assistant Professor of Naval Science

OBJECTIVES OF NAVAL SCIENCE DEPARTMENT

The purpose of the Naval Science Department is to provide the student with a well-rounded course in basic naval subjects, which, in conjunction with a baccalaureate degree, will qualify him for a commission in the United States naval service.

The NROTC midshipman is required to take 36 units of naval science in addition to the requirements for his baccalaureate degree.

Additional courses required by the Navy are as follows:

a) All Regular NROTC students must satisfactorily complete one year of college physics, including laboratory, by the end of the sophomore year.

b) College physics is not required of Contract NROTC students, but it is highly desirable that they take this course if their schedule permits.

c) All NROTC students must have completed mathematics through trigonometry either in secondary school or in college by the end of the sophomore year.

d) All NROTC students must take such instruction in swimming so as to qualify as a First Class Swimmer prior to graduation.

COURSES

[NOTE.—There are no naval science courses offered in the summer quarter; naval science courses are three quarter courses. Those courses ending with (1) are offered in autumn quarter, (2) in winter quarter, and (3) in spring quarter. Those with M as a suffix are for candidates for a Marine commission. The course numbers are assigned by the Navy Department and do not correspond to the general University plan of numbering courses, i.e., none are graduate courses.]

111, 112, 113. Naval Orientation.
9 units, autumn, winter, and spring quarters (DERUS) MWF 8, 10, 1; Lab. Th 8, 10, 1

211, 212, 213. Naval Weapons.
9 units, autumn, winter, and spring quarters (HEINBERG) MWF 8, 11, 12 Lab. Th 8, 11, 12

311, 312, 313. Navigation.
9 units, autumn, winter, and spring quarters (Kerr) MWF 9, 10, 1; Lab. Th 9, 10, 1

311M, 312M. Evolution of the Art of War.
6 units, autumn and winter quarters (Daze) MWF by arrangement Lab. Th by arrangement

313M. Modern Basic Strategy and Tactics.
3 units, spring quarter (Daze) MWF by arrangement Lab. Th by arrangement

411, 412. Naval Machinery, Diesel Engines, and Ship Stability.
6 units, autumn and winter quarters (Angle) MWF 9, 10, 1; Lab. Th 9, 10, 1

411M, 412M. Amphibious Warfare.
6 units, autumn and winter quarters (Daze) MWF by arrangement Lab. Th by arrangement

413, 413M. Military Justice and Leadership.
3 units, spring quarter (Angle and Parsons) MWF 9, 11, 1; Lab. Th 9, 11, 1

Naval Science Laboratory.—Two hours a week of Naval Science Laboratory are required of all NROTC midshipmen. The Monday session is held on the Drill Field. The Thursday session consists of practical work conducted in the regular classroom.

PHYSICAL EDUCATION

ALFRED R. MASTERS, Director of Physical Education and Athletics
MAUD L. KNAPP, Professor, and Director of Physical Education for Women

The activity courses for men and for women are listed below; for courses in health education and the professional courses in physical education, see material under the School of Education.

PHYSICAL EDUCATION FOR MEN

ERNST BRANDSTEN, Director of Water Sports, Emeritus
HENRY W. MALONEY, Director of Minor Sports, Emeritus
EDWARD M. TWIGGS, Director of Golf, Emeritus
HARRY MEIGGS WOLTER, Director of Baseball, Emeritus

ALFRED R. MASTERS, Director of Physical Education and Athletics
ELWYN BUGGE, Assistant Professor of Education and Physical Education
———, Director of Basketball
RICHARD CLEGG, Freshman Baseball and Basketball Coach
EVERETT S. DEAN, Director of Baseball
RAYMOND DEAN, Assistant Varsity Track Coach
ALLEN HENRY ELWARD, ROBERT V. GHILOTTI, PETER G. KMETOVIC, GEORGE LYNN, JOSEPH RUETZ, Assistant Football Coaches
WILLIAM PAUL FEHRING, Assistant Football and Baseball Coach
CHARLES FINGER, Director of Golf
THOMAS G. HAYNIE, JR., Director of Swimming
ERNEST P. HUNT, Associate Professor of Education and Physical Education
RAYMOND E. LUNNY, JR., Director of Boxing
ROBERT RENKER, Director of Tennis
ALEX P. SYSIN (COLONEL), Director of Equitation, Stanford Riding School
C. MYRON SPRAGUE, Associate Director of Physical Education
CHARLES A. TAYLOR, Director of Football
JACK A. WEIERSHAUSER, Director of Track
FRED J. PRIDDLE, Teaching Assistant in Soccer

ACTIVITY COURSES

Physical education is required each quarter of all Lower Division students except veterans of World War II. No credits (units) toward graduation are given for physical education during the first six quarters. After a student has satisfactorily completed six quarters of physical education, he receives one unit of credit for each additional quarter of physical education. Only one physical education course may be taken in any one quarter.

The following activity courses are open to both Lower Division and Upper Division students except those who need modified or individual activity programs.

11. Elementary Basketball.
Autumn, *winter, and *spring quarters (———)

12. Elementary Boxing.
Autumn, *winter, and *spring quarters (LUNNY)

13. Elementary Fencing.
Autumn and *spring quarters (BUGGE)

16. Elementary Gymnastics (Apparatus, Tumbling, and Trampoline).

Autumn, *winter, and *spring quarters (Hunt)

20. Elementary Swimming.

Each quarter (Sprague)

21. Elementary Tennis.

Each quarter (Bugge)

22. Elementary Track.

Autumn, *winter, and *spring quarters (Weiershauser)

23. Elementary Wrestling.

Autumn and *winter quarters (Staff)

24. Elementary Diving.

Each quarter (Sprague)

25. Elementary Handball.

Each quarter (Bugge)

27. Elementary Crew.

Autumn, *winter, and *spring quarters

30. Elementary Baseball.

Autumn, *winter, and *spring quarters (Dean)

111. Advanced Basketball.

1 unit, autumn and *winter quarters (———)

112. Advanced Boxing.

1 unit, autumn, *winter, and *spring quarters (Lunny)

113. Advanced Fencing.

1 unit, autumn, *winter, and *spring quarters (Bugge)

114. Freshman Football.

Autumn and *spring quarters (Taylor and staff)

114. Varsity Football.

1 unit, autumn and *spring quarters (Taylor)

115. Golf.

1 unit, each quarter (Finger)

116. Advanced Gymnastics (Apparatus, Tumbling, and Trampoline).

1 unit, autumn, *winter, and *spring quarters (Hunt)

119. Intermediate Swimming.

1 unit, each quarter (Sprague)

120. Advanced Swimming.

1 unit, each quarter (Sprague)

120a. Varsity Swimming.

1 unit, winter and *spring quarters (Haynie)

121. Advanced Tennis.

1 unit, each quarter (Renner)

122. Advanced Track.

1 unit, autumn, *winter, and *spring quarters (Weiershauser)

124. Advanced Diving.

1 unit, each quarter (Sprague)

124a. Varsity Diving.

1 unit, autumn, *winter, and *spring quarters (Haynie)

127. Varsity Crew.

1 unit, autumn, *winter, and *spring quarters

129. Water Polo.

1 unit, autumn quarter (Haynie)

130. Advanced Baseball.

1 unit, autumn, *winter, and *spring quarters (Dean)

139. Advanced Soccer.

1 unit, autumn quarter (Priddle)

140. Advanced Rugby.

1 unit, winter quarter (Staff)

141. Equitation (Beginning Western).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

142. Equitation (Intermediate Western).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

143. Equitation, Advanced (Jumping).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

144. Equitation (Beginning English).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

145. Equitation (Intermediate English).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

146. Equitation (Advanced English).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

147. Equitation (Beginning Polo).
1 unit, autumn, *winter, and *spring quarters (SYSIN)

148. Varsity Polo.
1 unit, autumn, *winter, and *spring quarters (SYSIN)

151. Pistol Marksmanship.—(Open only to ROTC students.)
1 unit, autumn, *winter, and *spring quarters (STAFF)

153. Weight Lifting.
1 unit, autumn, *winter, and *spring quarters (HUNT)

192, 193, 194. Techniques of Athletic Management.
1 unit, autumn, *winter, and *spring quarters (MASTERS)

SPECIAL AND MODIFIED PROGRAMS

2. Modified Programs.—Health-habit programs adapted to fit the special needs of the individual student for whom the usual class activities are not suitable. Admission on recommendation of the Director of Physical Education and Athletics. Three periods a week.
1 unit, each quarter (MASTERS AND STAFF)

[**Square Dance.**—See Physical Education for Women W22.]

[**Folk Dance.**—See Physical Education (Women) W25.]

[**Ski Conditioning.**—See Physical Education (Women) W68.]

PHYSICAL EDUCATION FOR WOMEN

MAUD L. KNAPP, Professor, and Director of Physical Education for Women
MARGARET C. BARR, LUELL WEED GUTHRIE, MIRIAM B. LIDSTER, MARIAN S. RUCH, Assistant Professors
MARGARET P. DUGGAR, ———, ———, ———, Instructors
MARGARET SYSIN, Assistant Director of Riding School

The Department of Physical Education for Women provides: (1) A physical education activity program which is planned to contribute to the all-round development which is essential for a student's success in college and in later life; contributions are made to the physical, social, intellectual, and cultural life of Stanford women students; (2) special courses of value to students majoring in elementary education; (3) a curriculum within the School of Education in professional physical education for the student working for the General Secondary Credential who desires a teaching major in this field; (4) a curriculum for the graduate student, leading to advanced degrees with a field of specialization in physical education (see School of Education).

The basis for the present physical education activity curriculum is a two-year requirement in the Lower Division, without credit, and an elective program with credit in the Upper Division. The underlying philosophy is to secure the participation of every woman in activity. To accomplish this the program is developed in the following ways: (1) *The instructional program* includes classes in elementary, intermediate, and advanced activity. Each class follows a definite teaching progression. (2) *The voluntary program* includes intramural tournaments for women in volleyball and basketball, intercollegiate sports days in archery, basketball, equitation, hockey, softball, swimming, tennis, recreation swimming, Orchesis (modern dance), Hoedowners (co-recreational folk dance), Ski Club, Swimming Club, Tennis Club, and Riding Club.

THE INSTRUCTIONAL PROGRAM REQUIREMENT

Physical education activity is required each quarter a student is registered in the Lower Division until six quarters have been satisfactorily completed. Each student may select the activity she desires according to her individual health needs, her interests, and her skill. One quarter of dance (modern, folk, or square) is required in the freshman year.

Credit.—For Lower Division students no credit is counted toward graduation until the Lower Division requirement of six quarters of activity has been completed, except as follows: women planning to major in physical education may be allowed credit in the Lower Division for activities taken in addition to the one necessary for fulfilling Lower Division activity requirement. One unit of University credit is given for each activity class satisfactorily completed by Upper Division students and this is counted as a part of the 180 units required for graduation.

Equipment.—The student provides her own tennis or badminton racquet, and gymnasium shoes. Golf clubs may be rented. The department provides costumes, towels, lockers, balls, shuttlecocks, bows and arrows.

A two-dollar fine is imposed for needlessly late registration in required courses.

ACTIVITY COURSES

W1–W100.—Each student may select from the following list the activity she wishes to take according to her present degree of skill and her total fitness as revealed by her orthopedic and health examinations. A student is encouraged not only to explore various activity fields but also to pursue one or two of them until she attains sufficient skill for real enjoyment.

W1. Posture.
(Ruch)

W8. Individual Assignment.
(Ruch)

W16. Modern Dance, Elementary.
(Duggar, ———)

W17. Modern Dance, Intermediate.
(Duggar, ———)

W18. Modern Dance, Advanced.
(Duggar)

W22. Square Dance.
(Lidster)

W23. Square Dance, Intermediate.
(Lidster)

W24. Folk Dance, Elementary.
(Lidster)

W25. Folk Dance, Intermediate.
(Lidster)

W26. Folk Dance, Advanced.
(Lidster)

W27. English Country Dance.
(Barr)

W31. Swimming, Elementary.
(———)

W32. Swimming, Intermediate.
(———, Ruch)

W33. Swimming, Advanced.
(———, Ruch)

W35. A.R.C. Lifesaving and Water Safety.
(———)

W36. Swimming, Competitive.
(RUCH)

W37. A.R.C. Water Safety Instructors' Course.
(———)

W38. Synchronized Swimming.
(———)

W39. Synchronized Swimming, Advanced.
(———)

W46. Archery, Elementary.
(BARR)

W47. Archery, Intermediate.
(BARR)

W48. Archery, Advanced.
(BARR)

W52. Badminton, Elementary.
(———, ———)

W53. Badminton, Intermediate.
(———, ———)

W54. Badminton, Advanced.
(———)

W58. Golf, Elementary.
(———)

W59. Golf, Intermediate.
(———)

W60. Golf, Advanced.
(———)

W62. Tennis, Elementary.
(———, GUTHRIE)

W63. Tennis, Intermediate.
(GUTHRIE, ———, ———)

W64. Tennis, Advanced.
(GUTHRIE)

W65. Tennis, Tournament.
(GUTHRIE)

W68. Ski Conditioning.
(GUTHRIE, ———)

W75. Fencing, Elementary.
(BARR, ———)

W76. Fencing, Intermediate.
(BARR)

W78. Field Sports.
(———)

W79. Softball.
(———)

W84. Basketball, Intermediate.
(———, ———)

W85. Basketball, Advanced.
(———)

W86. Field Hockey, Elementary.
(BARR, ———)

W87. Field Hockey.
(BARR, ———)

W89. Volleyball.
(STAFF)

W90. Volleyball, Advanced.
(———, ———)

W91. Gymnastics and Tumbling.
(RUCH)

W95. Equitation.
(SYSIN)

W100. Horsemanship (for P.E. majors).
(SYSIN)

PROFESSIONAL PROGRAM IN PHYSICAL EDUCATION

A statement regarding the required courses in the five-year program for a General Secondary Credential with a teaching-major in physical education, as well as descriptions of the professional courses, will be found under the School of Education, pages 32–45.

Music, 228
Music, Memorial Library, 319

Natural History Museum, 129
Naval Science, 377
Nursing, School of, 345
Nutrition, 45

Obstetrics, 330
Oceanography, 127
Organ recitals, 349

Pacific-Asiatic and Russian studies, 215
Paleontology, 357, 368
Pathology, 331
Pediatrics, 332
Petroleum, 361
Petrology, 367
Pharmacology, 334
Philosophy, 235
Physical Education, 42, 379
Physical Sciences, 241
Physical Therapy, 47
Physics, 242
Physiology, 335
Political Science, 252
Portuguese, 191
Predental requirements, 118, 348
Premedical requirements, 117
Preventive Medicine, 338
Psychology, 260
Public Health, 338
Public School Service credentials, 31

Radio and Television Institute, 291
Radiology, 339
Religion, 215
Religious services, 349
Romanic Languages, 176
Russia, 114

Secretarial training, 24
Slavic, 110
Social Sciences, 268
Social service, 273
Sociology, 274
Spanish, 191
Speech and Drama, 284
Statistics, 301
Stratigraphy, 368
Summer quarter courses, 9
Supervision credentials, 31
Surgery, 340

Teaching credentials, 32
Therapeutics, 334
Trustees, Board of, 6

Zoological collections, 130

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